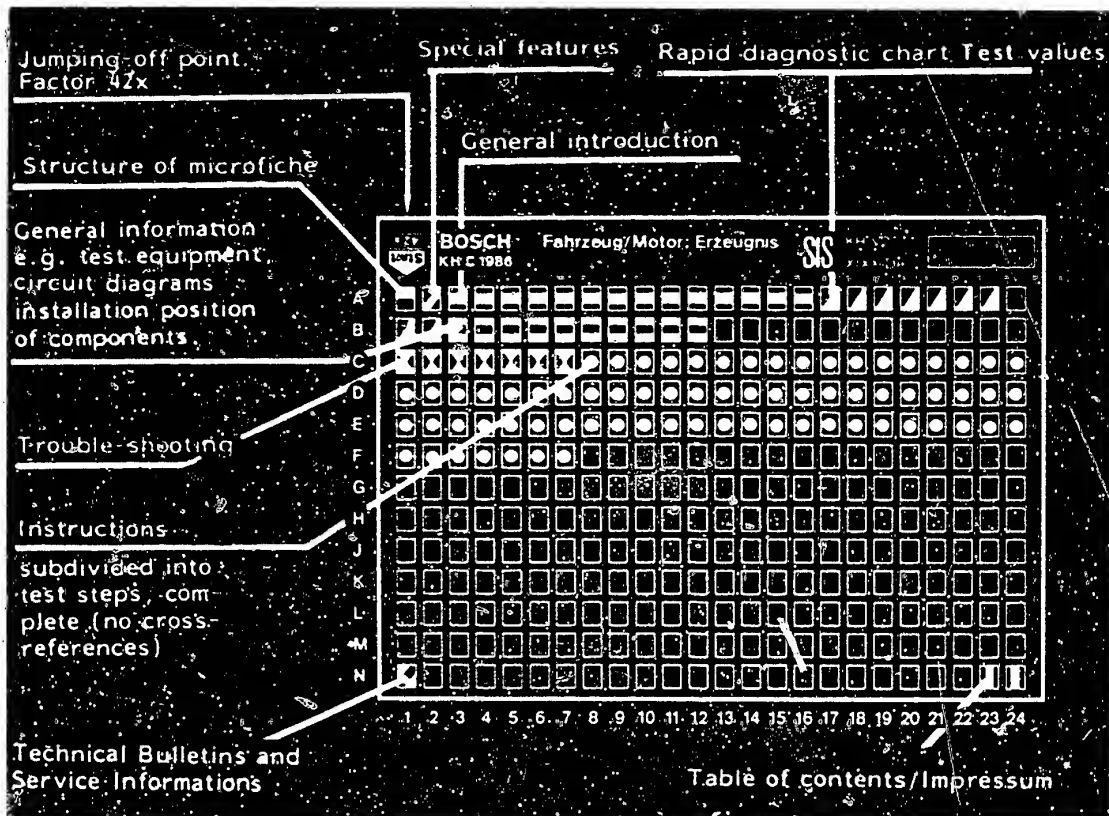


Structure of microfiche



1. Read from left to right
2. Title of microfiche (appears on each coordinate)

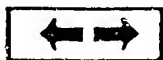
E16	Product/component/test step
	Vehicle/engine

Coordinate

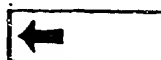
3. Limits of section



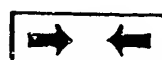
Beginning



Mid-section



End

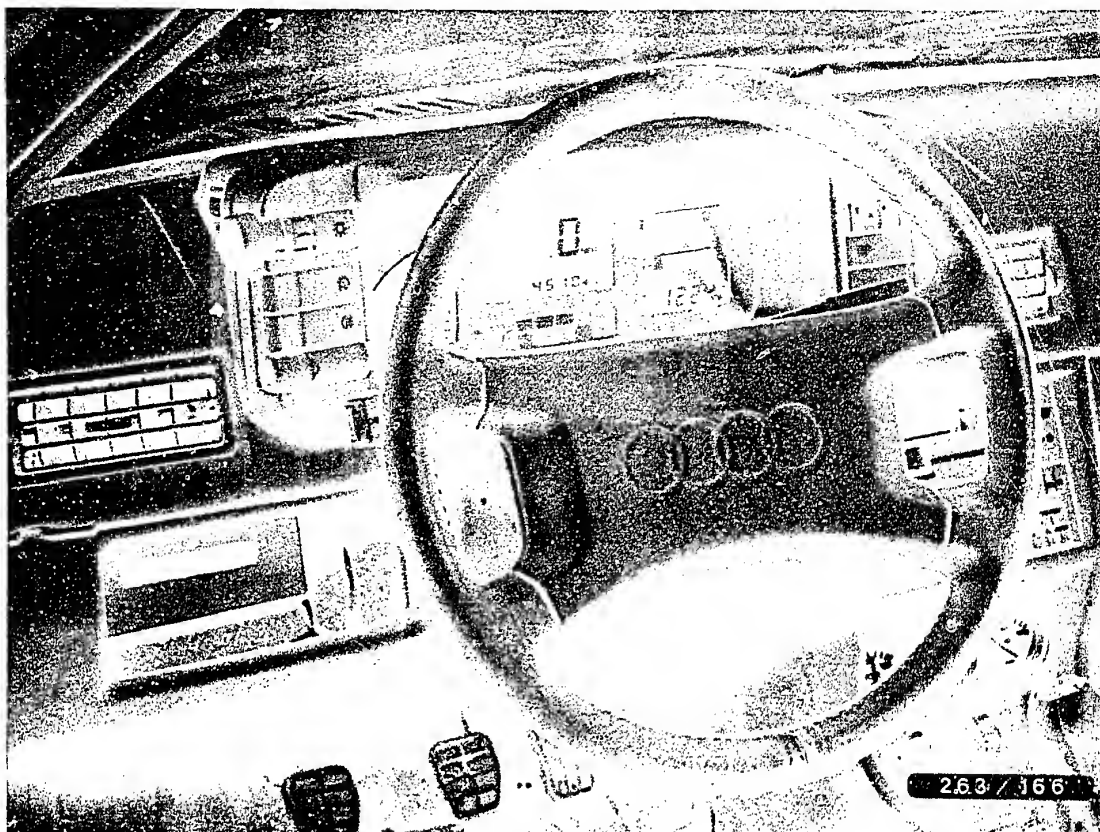


One-page section

4. References to relevant test steps in test specifications; coordinate e.g. C6

C6

A1	Trouble-shooting program	
-----------	--------------------------	--



1. Special features

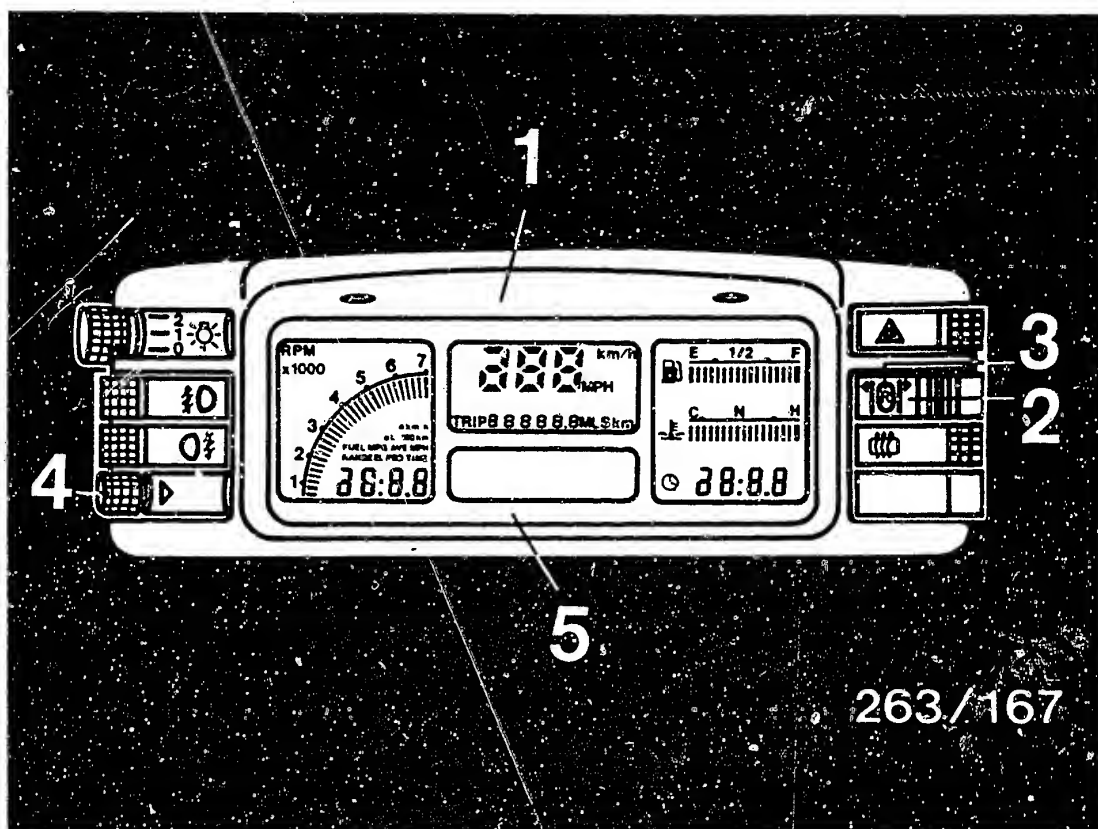
This microcard contains the testing and repair instructions with corresponding test specifications for the fully electronic instrument clusters with integrated trip computer 0 263 220 013, .. 014.

This instrument cluster is installed as of November 1985 in:

Audi Coupé (USA and Canada)

For the USA the speedometer display is switchable from km/h to miles.



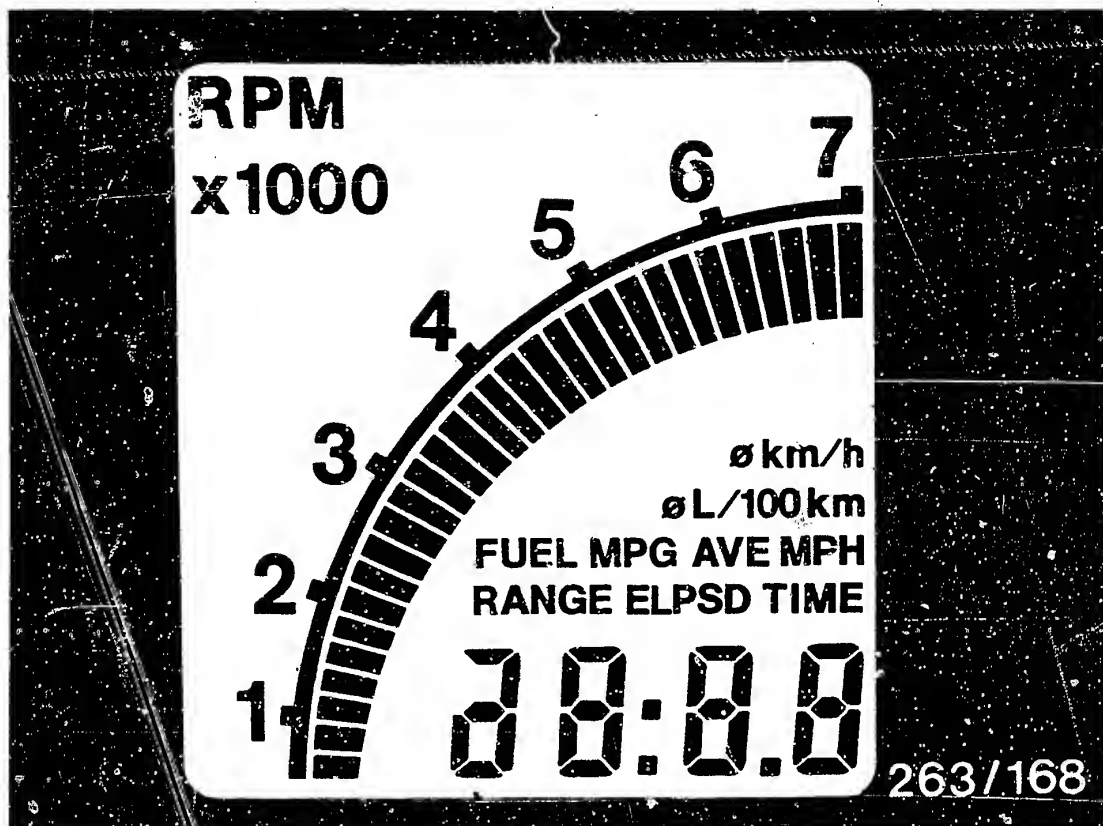


- 1 = LCD instrument cluster
- 2 = Rocker switch for trip-computer functions
- 3 = Reset button
- 4 = Switch for reduced display and brightness control
- 5 = Space for indicator and warning lamps

2. General introduction

As of Jan. 1986 Bosch is supplying for Audi vehicles a fully electronic instrument cluster with integrated trip computer in LCD (LCD = liquid crystal display).





Left-hand display field in instrument cluster
 0 263 220 013/014

Tachometer:

Display in bar-graph form with 32 illuminated segments. Uppermost segment corresponds to engine speed. When the limit speed is reached, all segments come on and flash at $n > 6390 \text{ min}^{-1}$.

Trip computer, 4 functions are offered.

USA	Canada
MPG AVE	ø L / 100 km
AVE MPH	ø km/h
FUEL RANGE	FUEL RANGE
ELPSD TIME	ELPSD TIME



Center display field:

	USA	Canada
Speedometer:	3...159 mph	5...255 km/h

Switchover from mph to km/h:

Actuate right-hand trip computer ≥ 2 sec, < 4 sec.

When mph or km/h flashes, release right-hand trip computer.





Center display field (continued):

Electronic odometer and trip meter display in kilometers:

Switchable with left-hand rocker of trip computer.
Press left-hand rocker ≥ 2 sec, < 4 sec.

Trip computer field goes dark.

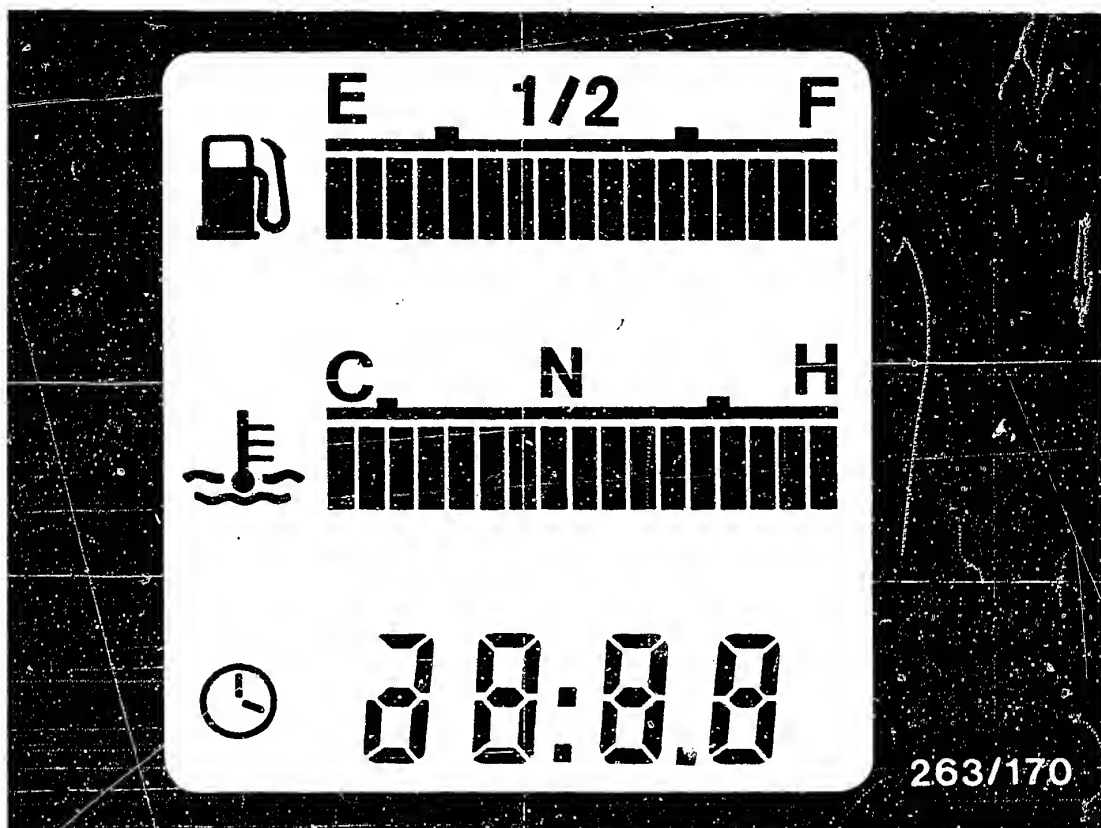
After ≥ 2 sec, mls, km or TRIP mls, TRIP km flashes, depending on current odometer display.

Release left-hand trip computer.

Press left-hand trip computer < 2 sec:

Odometer display is switched over.

Indicator and warning lamps in conventional design (bulbs).



Right-hand display field:

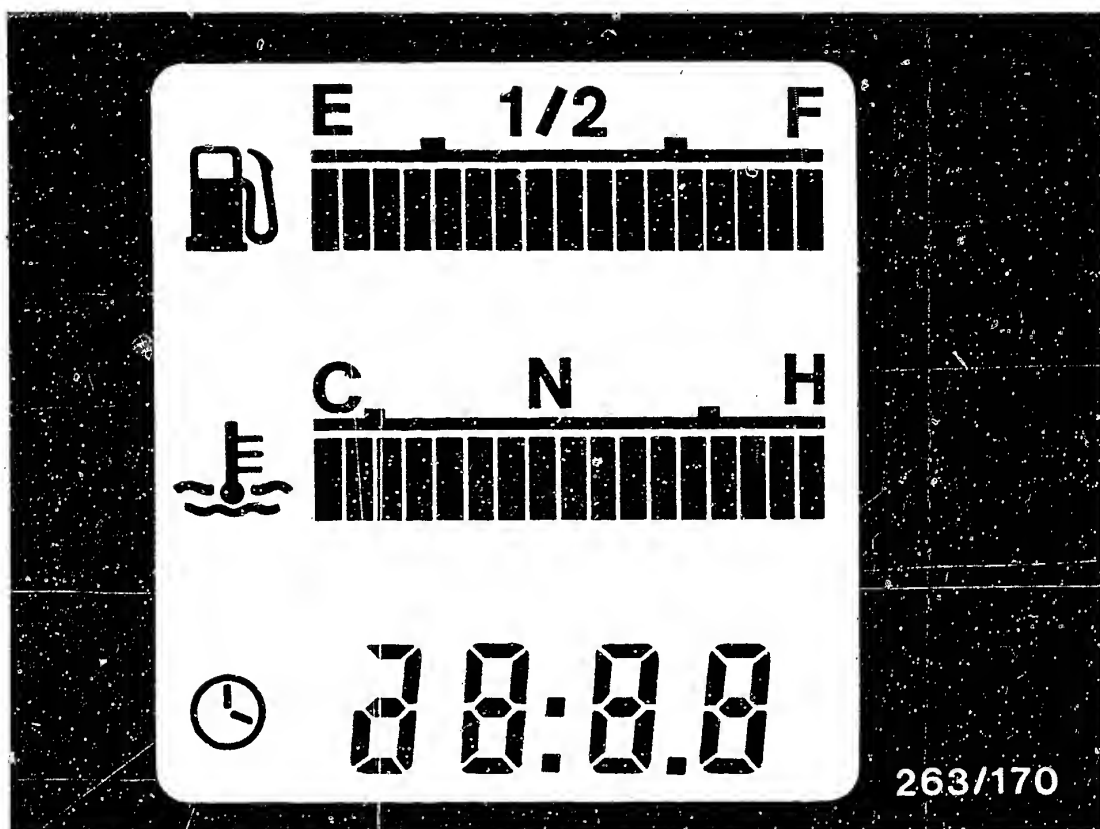
Fuel gauge: Quasi-analog with 17 segments
60 l for Coupé

If fuel gauge at segments 1 and 2, pump symbol flashes.

If contents in tank > 3.5 l for Coupé, only pump symbol flashes.

Trip computer moves to range (miles to empty) function and flashes with display E (empty) until acknowledged.





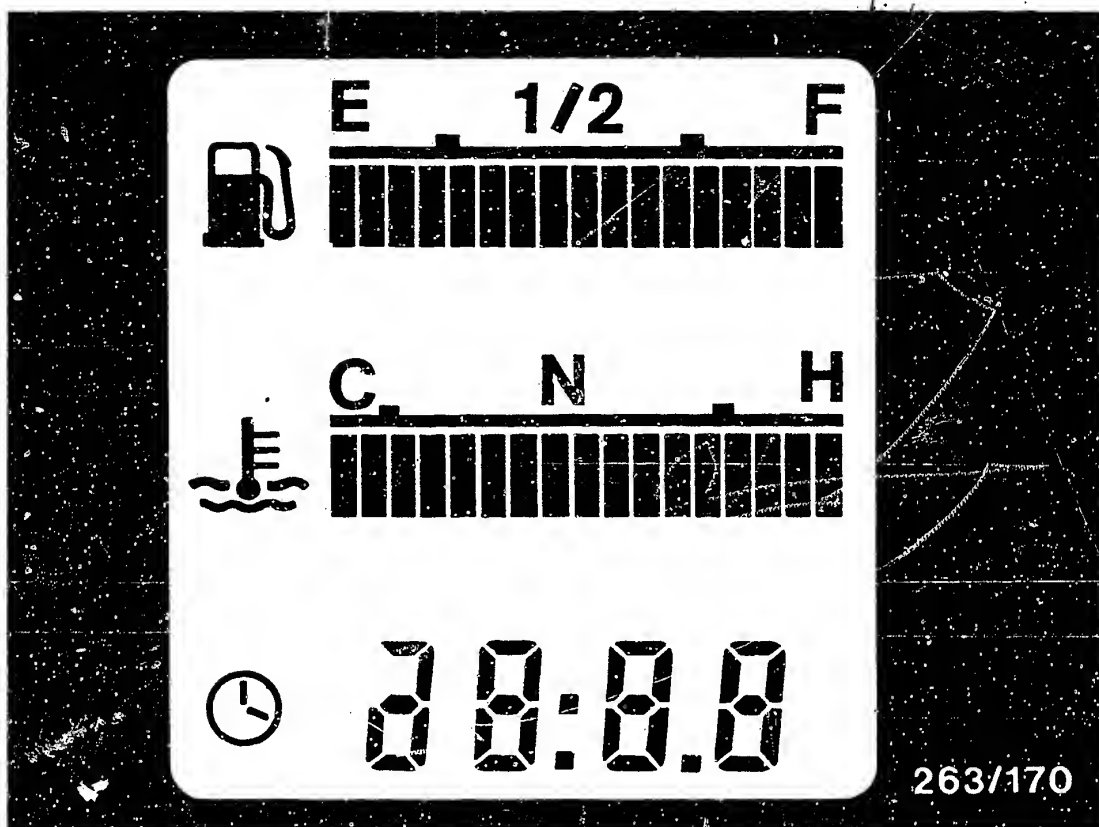
Coolant temperature:

Quasi-analog display with 17 segments.

2 segments surround the current reading.

At temperatures $> 135^{\circ}\text{C}$ the 4 segments of the measuring range (H) flash at a frequency of 1 Hz.





Right-hand display field (continued):

Clock: : Digital 3 1/2-place 7-segment display

USA : 12 hr mode (1:00-12:59)

Canada : 24 hr mode (0:00-23:59)

When the ignition is switched on, all segments are energized for 3 seconds. The digital display of the speedometer and the digital display of the trip computer each show a 2 in the first digit for 1 second and then a 1.

Situated in the cover frame of the instrument cluster on the right are 3 switches and, on the left, 2 rotary knobs and 2 switches. The right center switch is used for operating the trip computer.

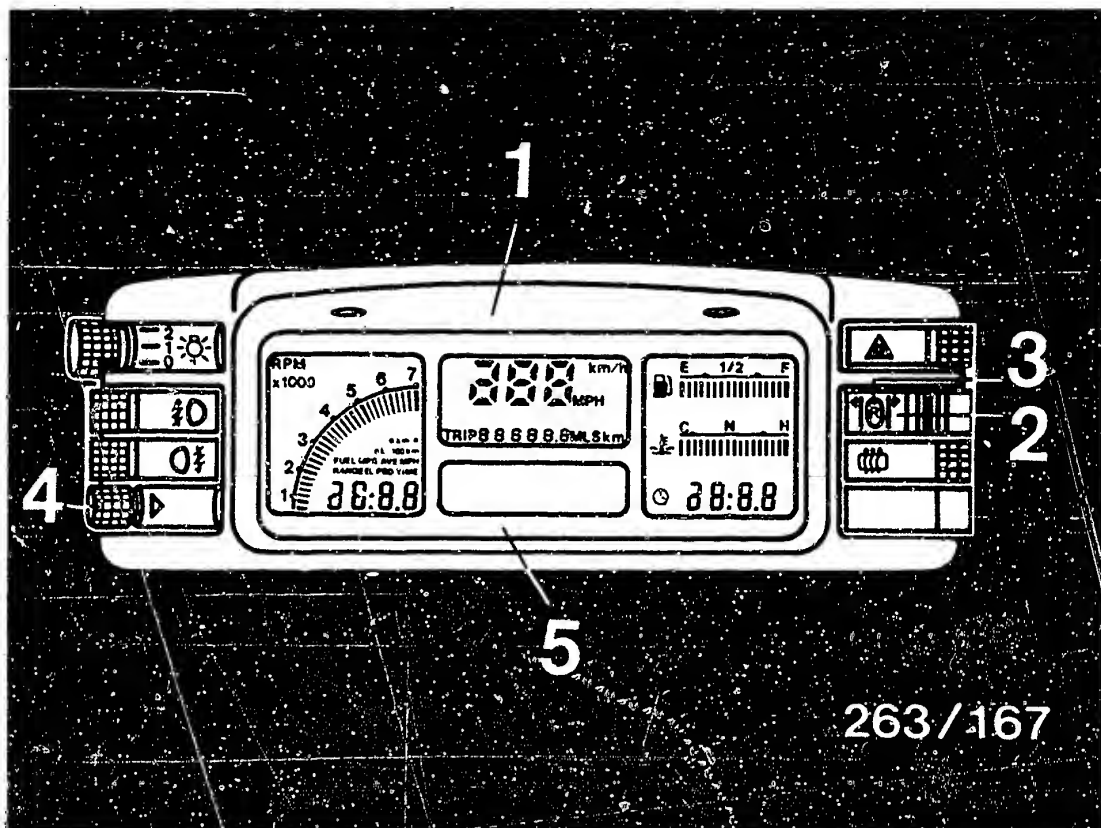
By pressing the rocker switch it is possible to call up the following trip-computer functions:

Instrument cluster 0 263 220 ..	013/014 Canada	013/014 USA
Average fuel consumption	Ø l/100 km	AVE/MPG
Average speed	Ø km/h	AVE/MPH
Range (miles to empty)	FUEL RANGE	FUEL RANGE
Elapsed time	ELPSD TIME	ELPSD TIME

In addition, the following functions can also be performed by means of the rocker switches:

- Setting the time
- Switching-over speedometer from mph to km/h
- Switching over odometer and trip meter from TRIP mls to TRIP km.





263/167

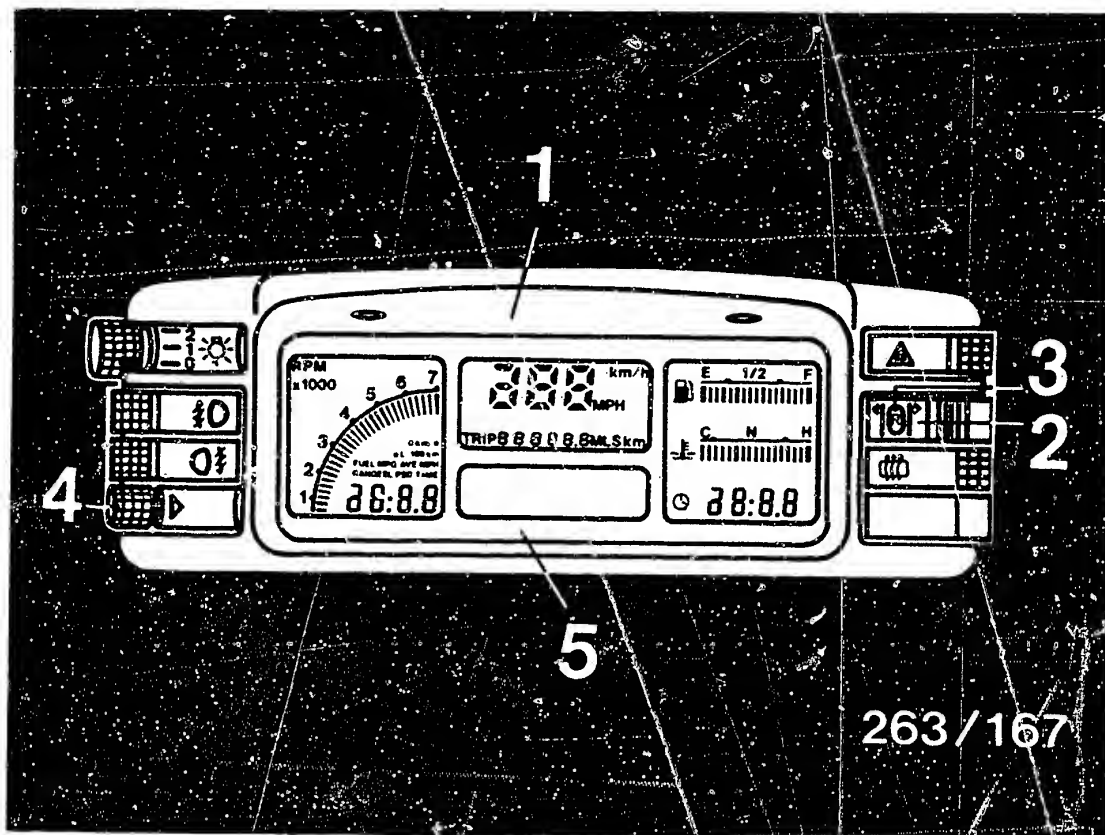
By pressing the reset button (3) for at least 2 sec, it is possible, with the ignition on, to reset the following selected trip-computer function:

- Average consumption
- Average speed
- Elapsed time.

Calculations are then restarted.

With the ignition off, the time of day and the odometer, including the back lighting, can be lit up with the reset button (3).





With button (4) for reduced display, it is possible to preselect the maximum/minimum display.

Maximum display:

Total scope of functions offered by the instrument cluster

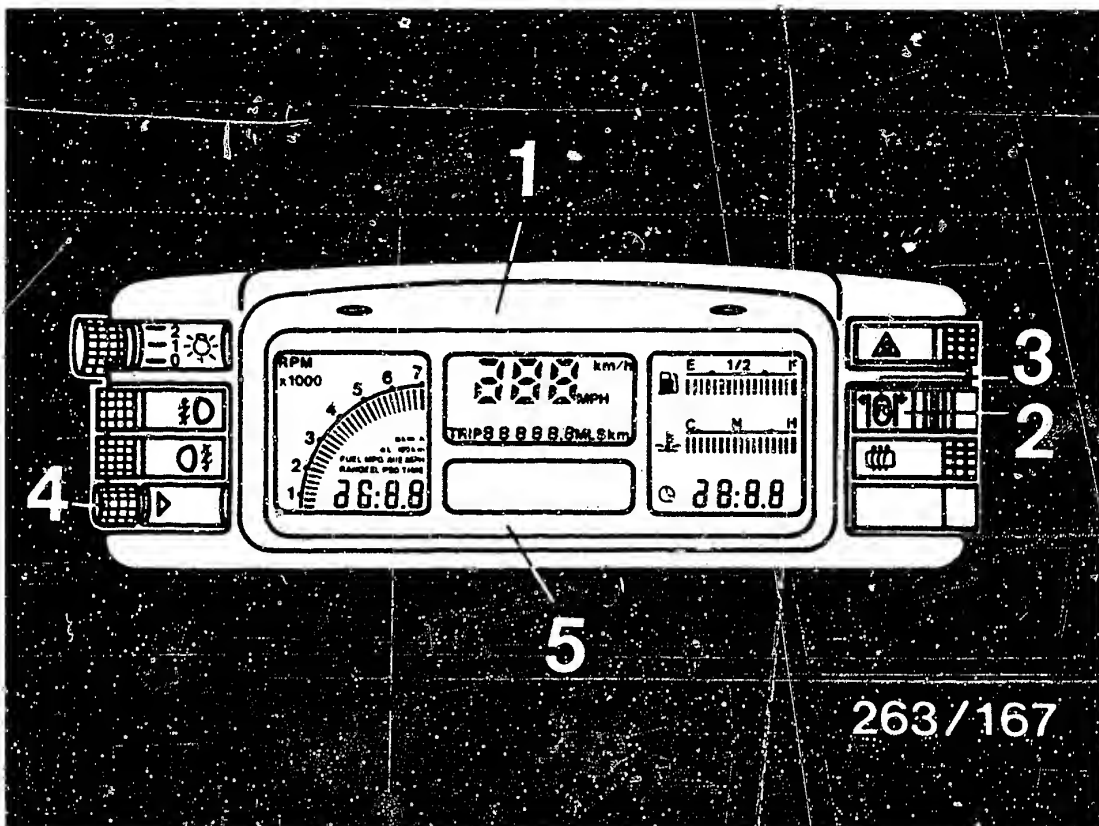
Minimum display I:

Speed, odometer, trip meter, time (including symbols and dimensions)

Minimum display II:

As I, but without time.





263/167

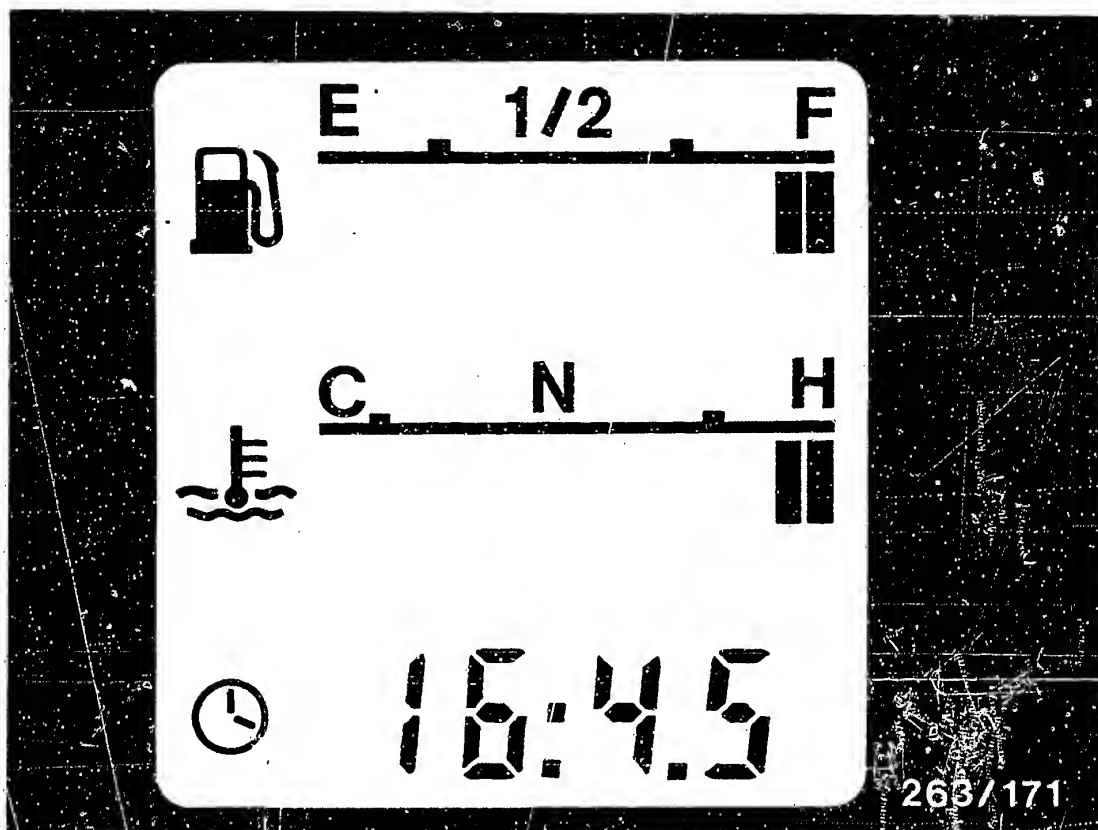
Switchover

Max to min I	press approx. 0.3 sec
Max to min II	press approx. 2 sec
MIN II, I to MAX	press approx. 0.3 sec

Warning function:

If there is a warning, there is a switch to the maximum display.

- Coolant temperature > 135°C
- Tank on reserve



Encoding of variants:

The following are taken into account on encoded variants:

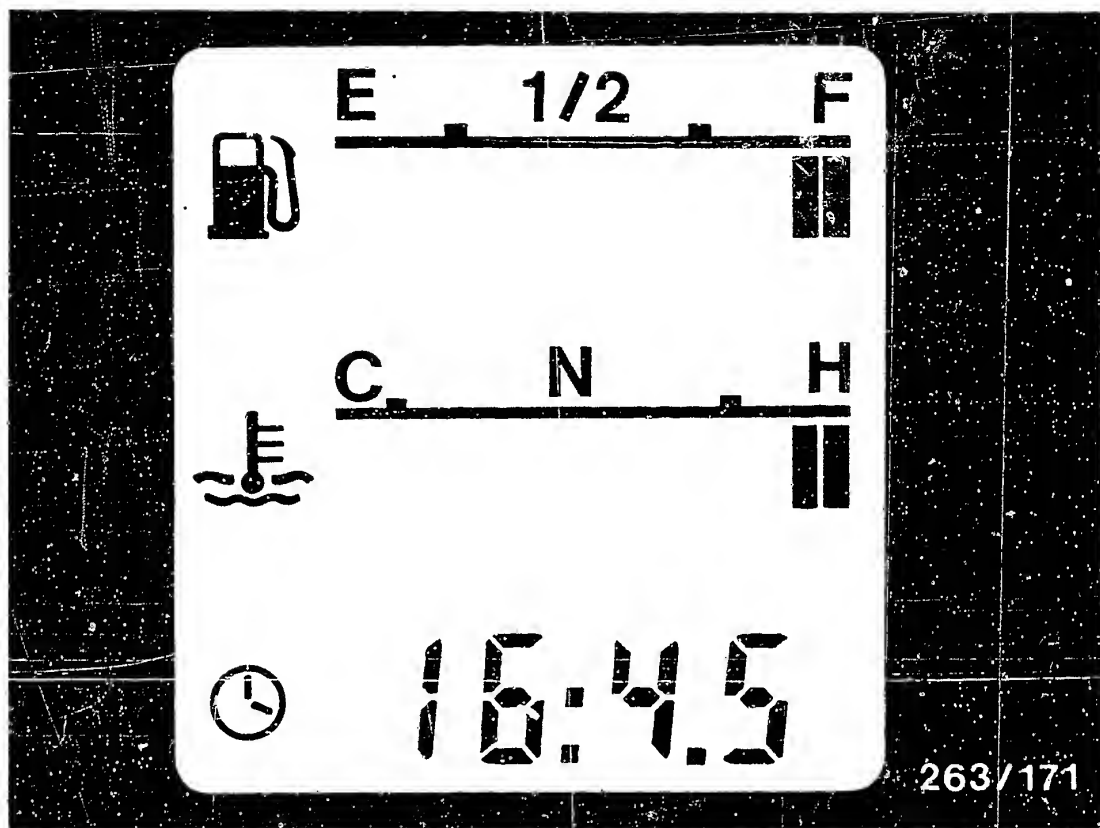
- KE2 - injection
- KE3 - injection
- KE3 - wiring-harness-end instrument ground at pin 1.

The valid coding is shown in tank-calibration mode on the display.

KE2 = Fuel gauge field segments 16 + 17 ON

KE3 = Coolant field segments 16 + 17 ON





Encoding of variants (continued)

Calling up the coding:

With "ignition OFF" press reset button and switch on ignition.

Engine stopped.

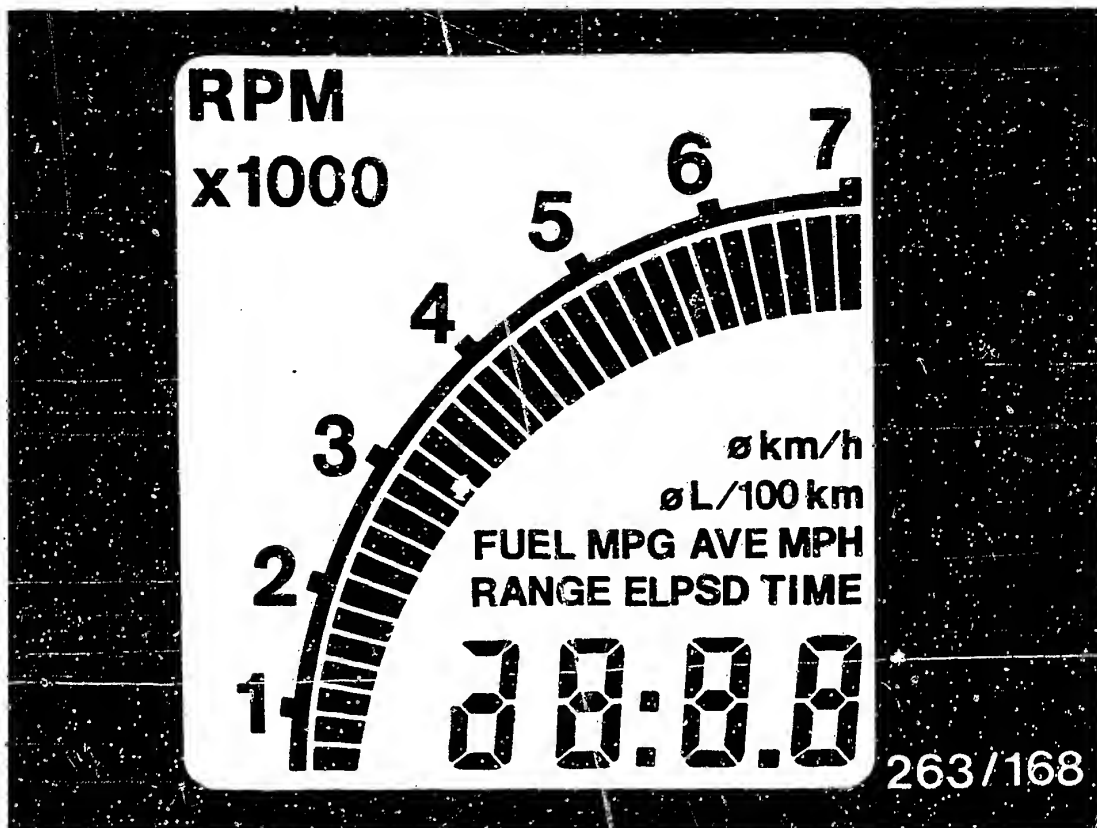
All scales and function designations are switched off.

In the fuel-gauge and temperature fields, segments 16 + 17 are lit up, depending on type of injection.

Consumption correction:

Coding is likewise shown in tank-calibration mode on the display.





Trip computer field

The numerical value goes from -15...+15 and shows the percentage deviation from the programmed consumption curve.

The measured fuel-consumption values can be corrected by $\pm 15\%$ by a potentiometer.



3. Rapid diagnosis chart

The following rapid diagnosis chart makes it possible for the experienced expert to quickly check the instrument cluster and the corresponding sensors/sensor signals using conventional test equipment.

For this purpose, the universal test adapter is connected with the system adapter lead between instrument cluster and vehicle wiring harness.

This chart contains the following information:

- Sequence of test steps
- Switches/switch positions on universal test adapter
- Test instructions and test specifications
- Reference to coordinates of the respective detailed testing and trouble-shooting program.
If detailed instructions and information are necessary, always proceed according to the trouble-shooting program starting on Coordinate B 1.

Test conditions

- Check the customer complaint.
(Check operation of instrument cluster in accordance with vehicle owner manual).
- Electrical sytem (fuses, battery voltage) O.K.



Rapid diagnosis chart

Test step	Switch position V	Ω	Explanatory remarks on testing (all measurements to ground)	Connection at 35-pin plug of instrument cluster	Test specification	Coordinates
1	↓	1	Ground check - vehicle ground to 35-pin plug of vehicle wiring harness	21 / 22	approx. 0 ... 10 Ω	C 17
2	↓	6	Ground check KE2 / KE3 encoding	1 → 21	approx. 0 ... 10 Ω	C 19
3*	↓	7	Coolant-temperature sensor R ₂₀ = Resistance at + 20°C R ₄₀ = Resistance at + 40°C R ₆₀ = Resistance at + 60°C R ₉₀ = Resistance at + 90°C R ₁₁₀ = Resistance at + 110°C R ₁₂₀ = Resistance at + 120°C	26 → 21	 R ₂₀ = approx. 1000 Ω R ₄₀ = approx. 500 Ω R ₆₀ = approx. 187-247 Ω R ₉₀ = approx. 75- 97 Ω R ₁₁₀ = approx. 44- 58 Ω R ₁₂₀ = approx. 37- 45 Ω	C 21
4*	↓	8	Tank sender R _{empty} = resistance with empty tank R _{full} = resistance with full tank	24 → 21	R _{empty} approx. 283 Ω R _{full} approx. 40 Ω	C 23
5	↓	11	Ground connection of fuel-consumption sensor	28 → 21	approx. 0 ... 12 Ω	D 1

* = Plug disconnected from instrument cluster

A18

Rapid diagnosis chart

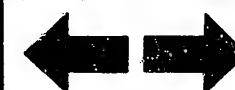
Audi




A19

Rapid diagnosis chart

Audi



Rapid diagnosis chart (continued)

Test step	Switch position V Ω	Explanatory remarks on testing (all measurements to ground)	Connection at 35-pin plug of instrument cluster	Test specification	Coordinates
6		20 120° temperature switch short-circuit Ω sockets on UNI adapter	27 → 21	Reading on instrument: temp. flashes	D 3
7	1	- Battery voltage term. 30 on instrument cluster	19/20 → 21	approx. 12 V	D 5
8	3	- Voltage from term. 15, ignition ON	15 → 21	approx. 12 V	D 7
9	7	- Voltage from term. X, ignition ON	11/12 → 21	approx. 12 V	D 9
10	8	- Start engine (engine-speed pulses at term. 7 of ignition trigger box at idle) Measurement with multimeter (analog)	4 → 21	> 1.5 V ≤ 12 V	D 11
11	9	- Oil-pressure switch for 0.35 bar opens as of approx. 0.3 bar. Voltage rises from 0 V to approx. 12 V. Engine idling.	17 → 21	approx. 12 V	D 13

A20

Rapid diagnosis chart
Audi



A21

Rapid diagnosis chart
Audi



Rapid diagnosis chart (continued)

Test step	Switch position V Ω	Explanatory remarks on testing (all measurements to ground)	Connection at 35-pin plug of instrument cluster	Test specification	Coordinates
12	10	-	Displacement pulse generator (supplies rectangular voltage). Ignition ON and move vehicle approx. 1 m.	5 → 21 0- approx. 5V-0V and approx. 5V-0-approx. 5V	D 15
13	11	-	Fuel consumption sensor supply voltage, ignition ON	10 → 21 7 ... 8 V	D 17
14	12	-	Sensor reading (depending on current position of consumption sensor) Ignition ON	29 → 21 0 ... 8.0 V	D 19
15	13	-	Press left-hand rocker of rocker switch for trip computer Ignition ON	6 → 21 2.5 ... 1.5 → 0 V	D 21
16	14	-	Press right-hand rocker of rocker switch for trip computer Ignition ON	7 → 21 2.5 ... 1.5 → 0 V	D 23
17	15	-	Press reset switch Ignition ON	9 → 21 3.5 ... 4.5 → 0 V	E 1

A22

Rapid diagnosis chart

Audi



A23

Rapid diagnosis chart

Audi



Rapid diagnosis chart (continued)

Test step	Switch position V Ω	Explanatory remarks on testing (all measurements to ground)	Connection at 35-pin plug of instrument cluster	Test specification	Coordinates
18	16	-	Press button for reduced display (min, max) Ignition ON	2 → 21 0 V → approx. 12 V	E 3
19	17	-	Press brightness control for instrument cluster Driving lights ON, ignition ON	25 → 21 approx. 9...12 V	E 5
20	18	-	KE2/KE3 encoding Engine running.	KE/2 KE/3 1 → 21 3 ... 5 V 0 V	E 7
21	19	-	Lambda sensor KE2 (engine hot) idling	23 → 21 2.4 ... 2.5 V	E 9
22	20	-	Consumption signal KE3 Engine running, lambda sensor must be at operating temperature	3 → 21 0 → U _{Batt.} Change with engine running	E 11
23	21	-	Supply voltage to outside brightness sensor. Engine running.	8 → 21 approx. 5 V	E 13
24	22	-	Outside brightness sensor Output Ignition ON. With increasing brightness, voltage also rises	30 → 21 0 → 5 V	E 15

B1

Rapid diagnosis chart

Audi



B2

Rapid diagnosis chart

Audi



4. Test equipment

Universal test adapter

0 684 101 801

Adapter lead

KDES 0005

Multimeter

Ri = 20 k Ω

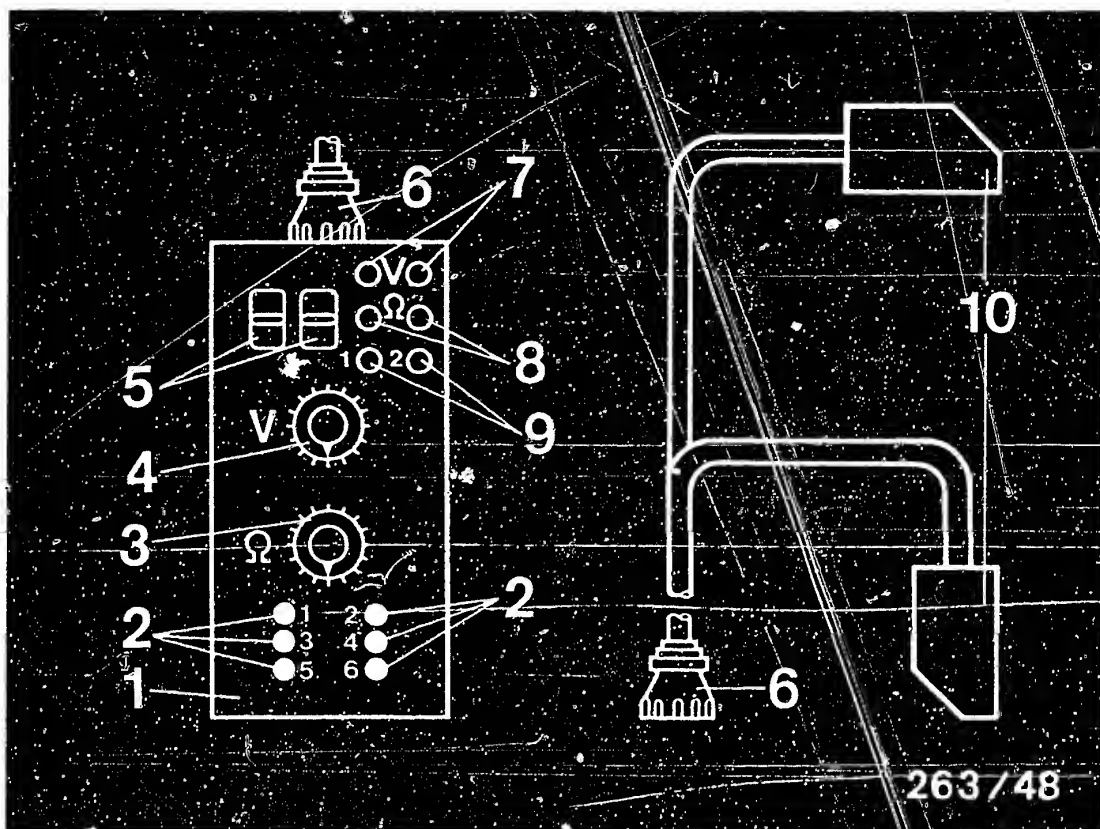
commercially available

B3

Test equipment

Audi





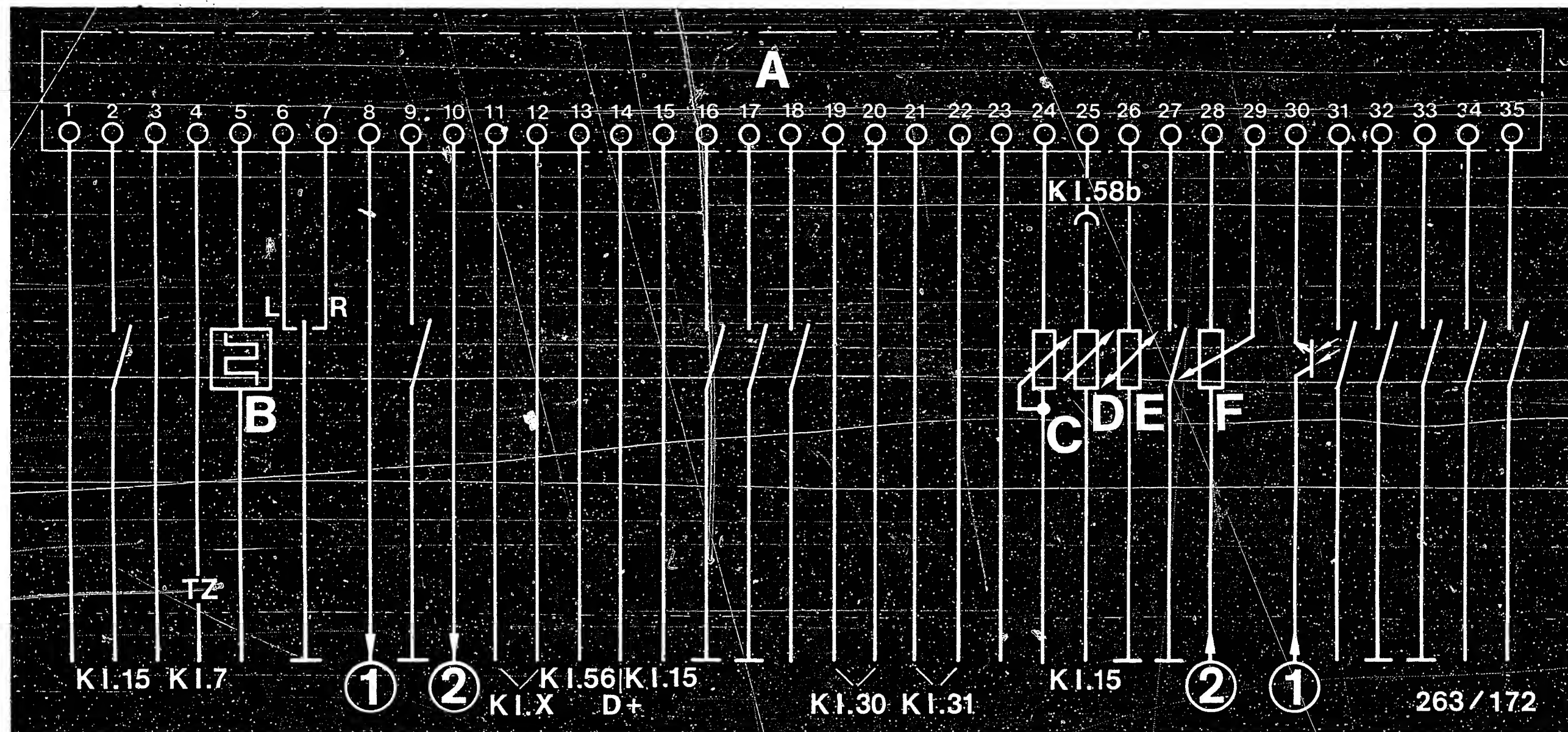
- 1 = Universal test adapter 0 684 101 801
- 2 = Button panel - simulations
- 3 = Program switch for resistance measurements
- 4 = Program switch for voltage measurements
- 5 = Test well for special input of motortester
- 6 = 63-pin plug connection for adapter lead KDES 0005
- 7 = Test sockets for voltage measurements
- 8 = Test sockets for resistance measurements
- 9 = Sockets for special functions
- 10 = Adapter lead KDES 0005 with 35-pin plug and connector

4.1 Universal test adapter with adapter lead KDES 0005

B4

Test equipment
Audi





5. Terminal diagram (terminal assignment) of instrument cluster

A = Instrument cluster
B = Displacement sensor

C = Tank sender
D = Brightness control

E = Temperature sensor
F = Consumption sensor

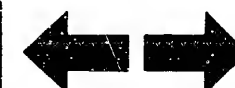
B5

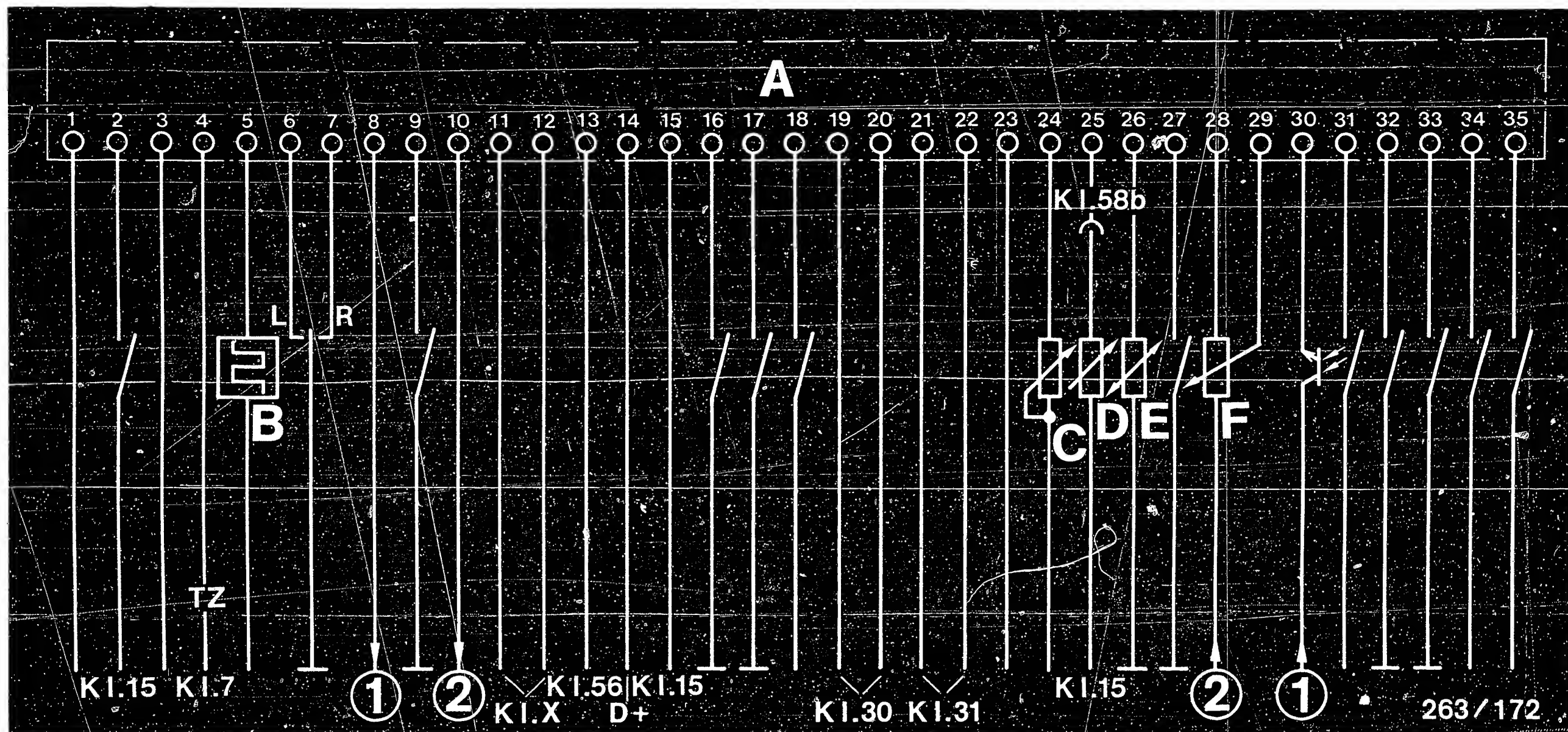
Terminal diagram
Audi



B6

Terminal diagram
Audi





Terminal diagram (terminal assignment) of instrument cluster

1	= KE2/KE3 encoding	10, 28, 29	= Consumption KE2	23	= Lambda KE2
2	= MIN/MAX switch	11, 12	= Term. X	24	= Tank
3	= Consumption KE3	13	= Switch indicator term. 56	25	= Brightness sensor
4	= Engine-speed signal from transistorized ignition	14	= Charge indicator term. 61	26	= Coolant temperature
5	= Displacement sensor	15	= Term. 15	27	= Temperature switch 120°
6	= Trip-computer - left	16	= Handbrake switch	31	= Upper beam
7	= Trip-computer - right	17	= Oil pressure	32	= Belt warning
8, 30	= Outside brightness sensor	18	= Turn signal, right	33	= Engine electrics
8	= Reset switch for trip comp.	19, 20	= Term. 30	34	= Turn signal, left
		21, 22	= Term. 31	35	= Heated rear window

B7

Terminal diagram

Audi



B8

Terminal diagram

Audi



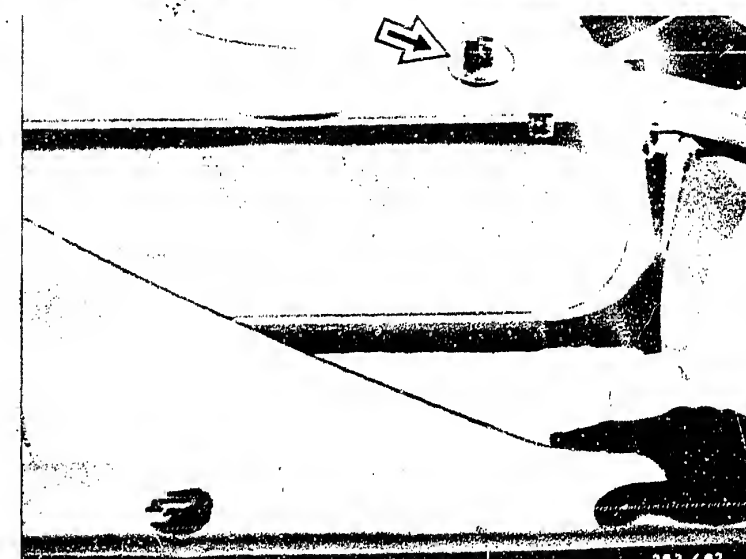
6. Installation position of components

Electronic instrument cluster : In place of conventional instrument cluster behind steering wheel (not shown)

Coolant-temperature sensor : On engine block (see arrow, top picture)

Tank sender : In luggage compartment (see arrow, center picture)

Oil-pressure switch : Near oil dipstick (see bottom picture)



B9

Installation position of components

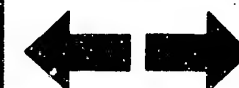
Audi



B10

Installation position of components

Audi



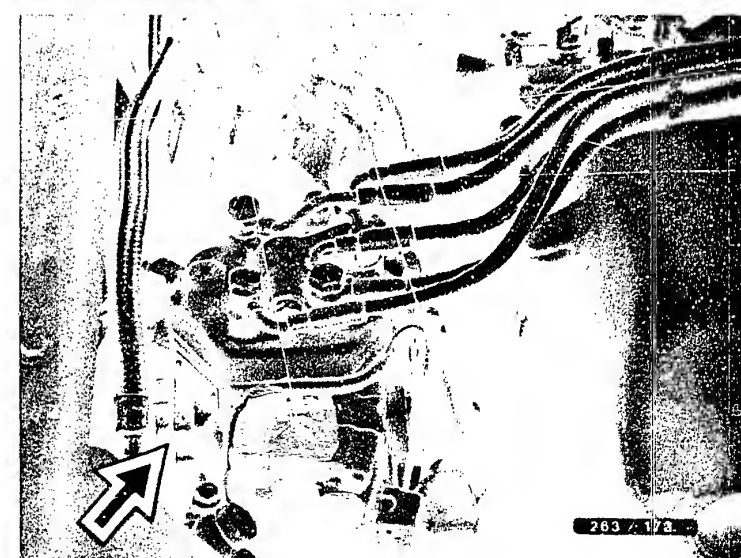
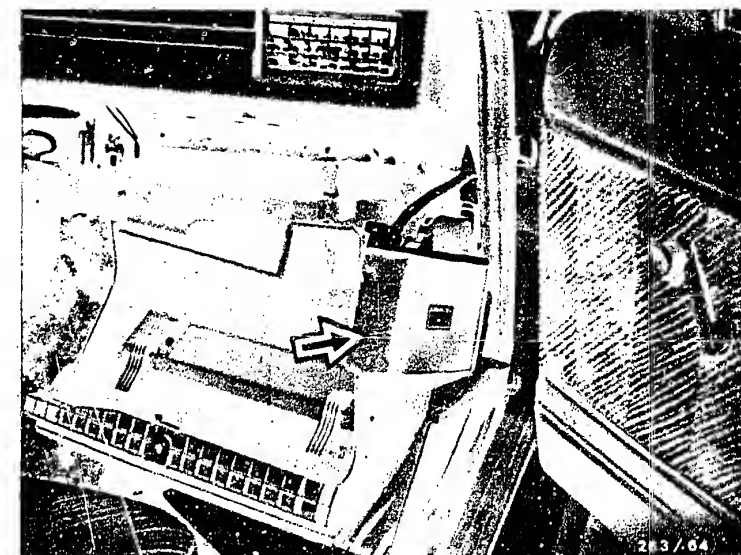
Installation position of components (continued)

Control unit of KE-Jetronic : Right of glove compartment (see arrow, top picture)

Displacement pulse generator : On front differential, accessible on vehicle from below (see arrow, center picture)

Fuel-consumption sensor : On air-flow sensor of K-Jetronic (see arrow, bottom picture)

Battery : Under rear seat bench (not shown)



B11

Installation position of components
Audi



B12

Installation position of components
Audi



7. Trouble-shooting

7.1 Trouble-shooting according to fault symptoms

The below-listed fault symptoms may be due to one or more faults.

Test conditions:

Check the customer complaint (check operation according to owner manual).

Fault symptom

- 1. Instrument cluster not lit when ignition on
- 2. Instrument cluster not lit when pressing light-up button but lit when ignition on
- 3. All displays stop for longer than 3 sec after switching on ignition
- 4. Tachometer display not functioning
- 5. Speedometer display not functioning
- 6. Fuel gauge not functioning
- 7. Temperature gauge not functioning

<u>Cause</u>							<u>For testing see Coordinates</u>
•							Battery voltage term. 30/term. 31 not present at instrument cluster C 17, D 5
	•						Reduced-display button defective (lead from reduced-display button) E 3
•							Open circuit in lead from term. 15 D 7
•	•	•	•	•	•	•	Instrument cluster defective, replace F 4
			•				No engine-speed signal from transistorized ignition term. 7 D 11
				•			Displacement pulse generator or lead defective D 15
					•		Tank sender or lead defective C 23, D 1
						•	Temperature sensor or lead defective D 3
		•					Battery voltage too low D 5, D 7

C1

Trouble-shooting

Audi

**G2**

Trouble-shooting

Audi



Trouble-shooting according to fault symptoms (continued)

8. Consumption indicator not functioning (trip computer)

9. No display on trip computer

10. Incorrect display on trip computer

11. Indicator lamp for: handbrake, oil pressure, charge indicator, OXS, belt warning, engine electrics, driving-lights warning

12. Indicator lamp for: turn signals (right, left), heated rear window, upper beam

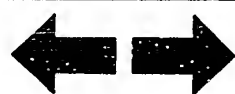
13. Indicator lamp for "charge" always lit

14. Display poorly visible

						<u>Causes</u>	<u>For testing see Coordinates</u>
•						Fuel-consumption sensor or lead defective on KE2	D 17, D 19
•	•	•				No signal from KE3	E 11
•	•	•	•	•		Replace instrument cluster or corresponding sensors	C 21, C23, F 4, D 1, D 15
			•	•		Bulbs defective, replace	---
				•		No ground connection (in vehicle)	C 17
			•			No connection from term. 15 (in vehicle)	D 7
			•			Oil-pressure switch defective	D 13
					•	Battery charging not O.K.	D 9, D 7, D 5
				•		No ground connection (inside instrument cluster)	---
					•	Display brightness control or plug defective	E 5

C3

Trouble-shooting
Audi



C4

Trouble-shooting
Audi



Trouble-shooting according to fault symptoms (continued)

- 17. Switchover mph → km in time-of-day position with reset button pressed 2 sec not functioning
- 18. KE2/KE3 encoding not functioning
- 19. Instantaneous consumption not moving to zero in trip computer on overrun cutoff
- 20. No reserve display "(E)" in trip computer when tank < 3.5 l
- 21. Clock switchover USA → Canada not functioning
- 22. No encoding display in tank-calibration mode on display
- 23. Min/max changeover on display not functioning
- 24. Automatic min/max changeover on display not functioning

Cause								For testing see Coordinates
•								Reset button defective (no ground connection) E 1
•	•	•	•	•	•	•	•	Instrument cluster defective (replace) F 4
		•						Fuel consumption sensor defective or lead D 17, D 19
		•						No signal for overrun cutoff D 17, D 19
						•		Lead term. 15 or switch defective D 17



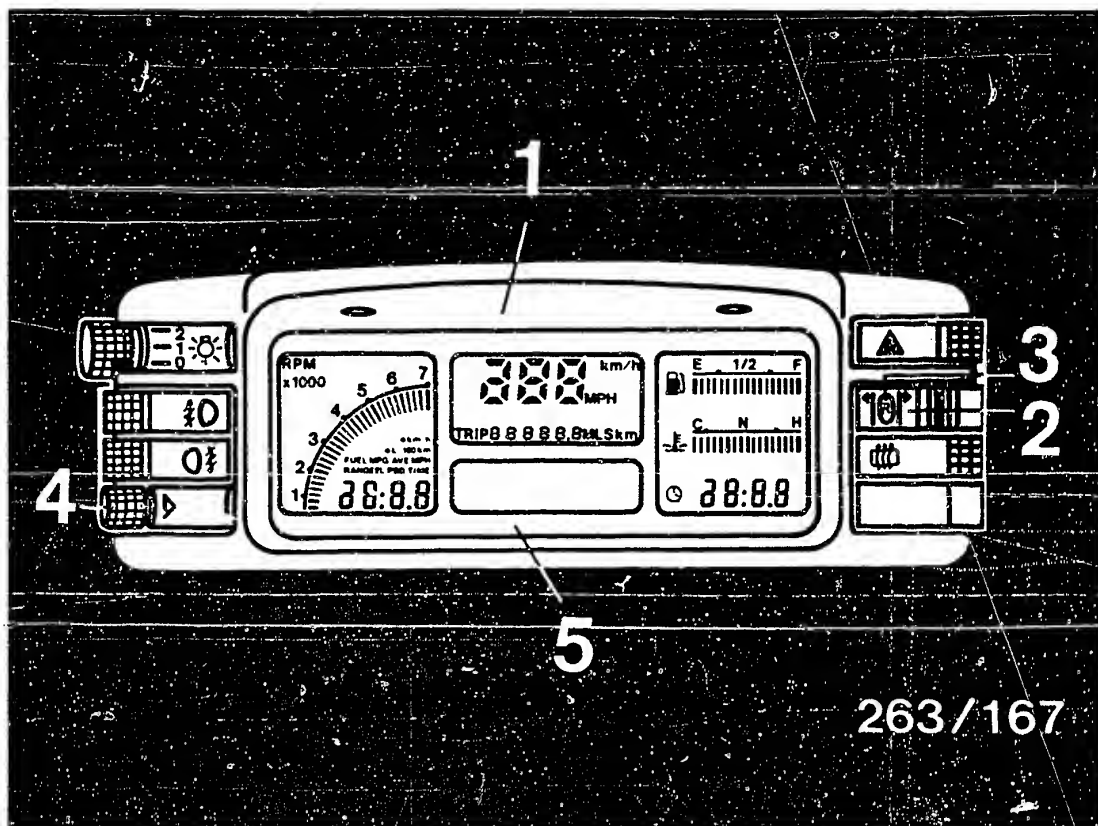
7.2 Trouble-shooting according to test steps

- Before testing:
Check the customer complaint (check operation of instrument cluster in accordance with owner's manual).
- Electrical system (fuses, battery voltage etc.) O.K.
- When working on the fuel system, observe accident prevention regulations as well as environmental and health regulations.
- Check all functions with the vehicle stationary and before removing the instrument cluster.

When performing the detailed trouble-shooting starting on Coordinate C 17, go through the test steps one after the other.

Only if a malfunction is indicated, continue with the trouble-shooting which is set out below each test step.





263/167

- 1 = Instrument cluster
- 2 = Rocker switch for trip computer functions
- 3 = Reset switch
- 4 = Reduced-display switch and brightness control
- 5 = Field for indicator and warning lamps

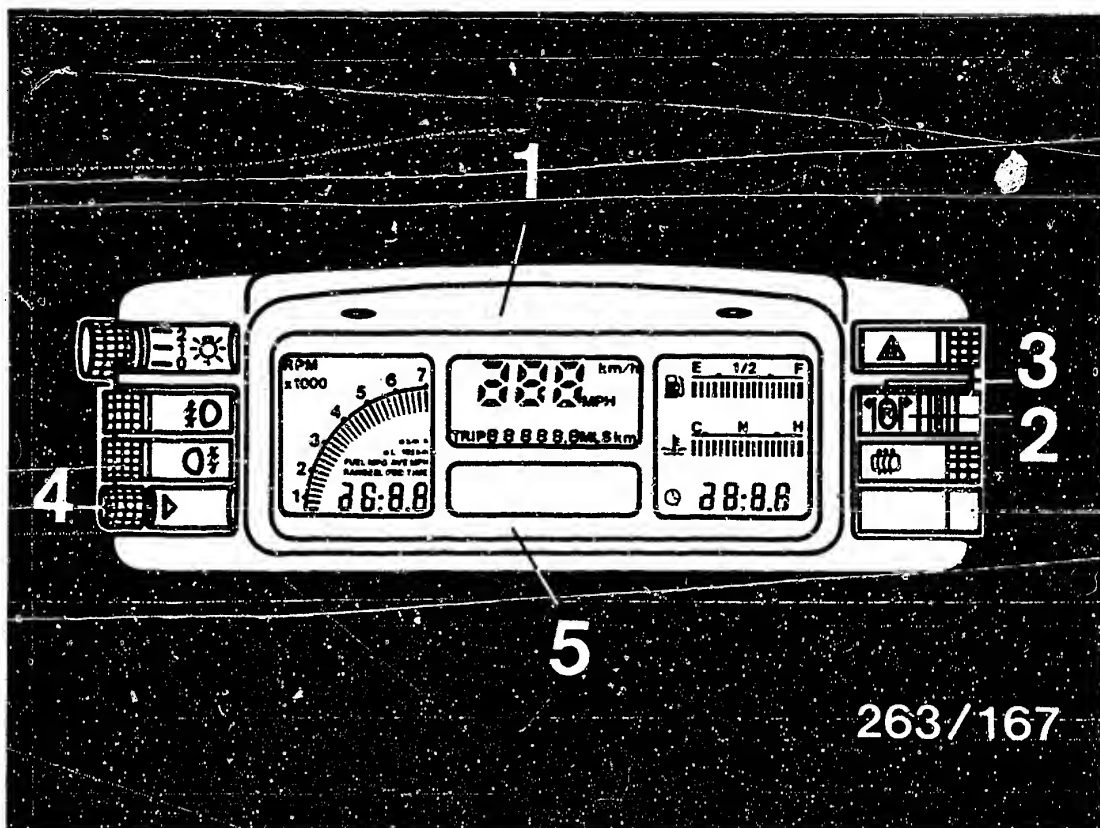
7.3 Functional test of instrument cluster

Functional test with ignition OFF

Press reset button (3):

Time, odometer and illumination are lit up.





263/167

Functional test with ignition ON, engine not running

When the ignition is switched on, all electronic displays are automatically energized for 3 seconds. The digital displays of the speedometer and of the trip computer each show a 2 in the first digit for 1 second and then a 1.

Then: Speedometer display: 0 km/h (0 mph)
 Engine speed: no segments

Trip computer shows selected function:

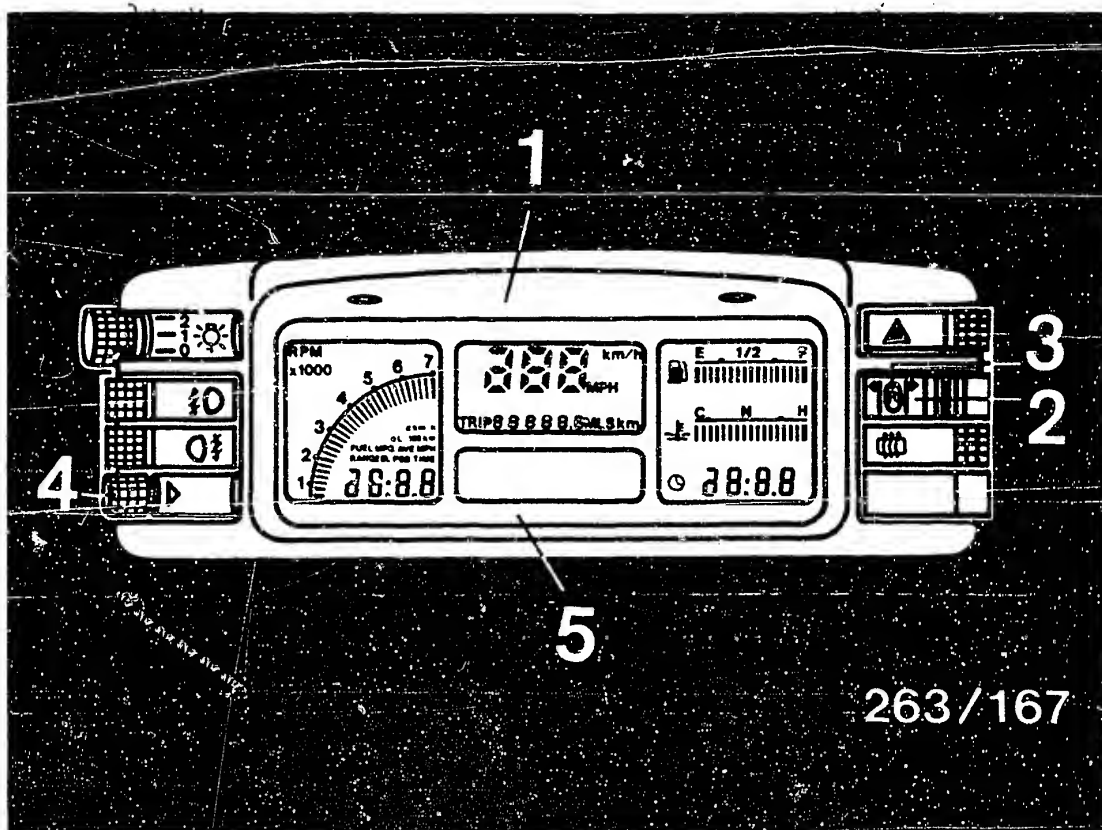
Time

Odometer display km (MLS)

Coolant temperature: instantaneous temperature

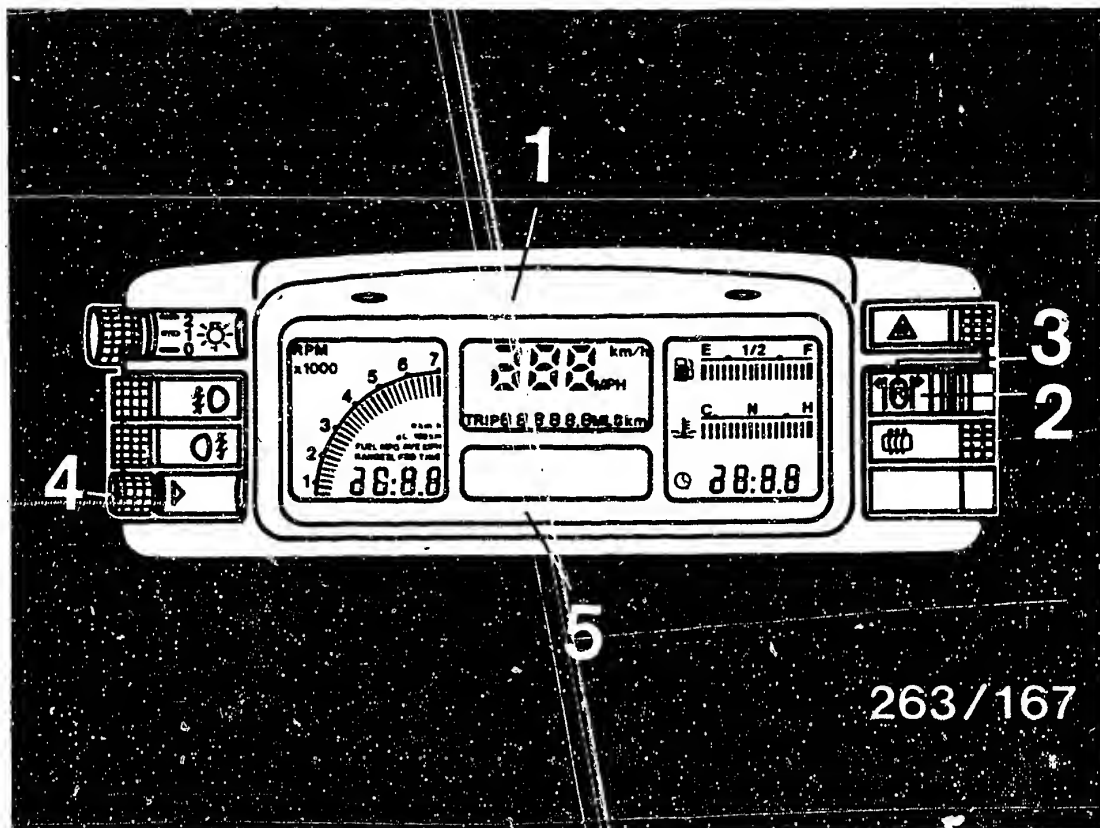
Fuel gauge: instantaneous tank level





Functional test with ignition ON, engine running, vehicle stationary.

Speedometer display:	0 km/h (0 mph)
Engine speed:	instantaneous reading
Odometer display:	km / MLS
Time:	Instantaneous value
Coolant temperature:	Instantaneous value
Tank level:	Instantaneous value



Functional test with ignition ON, engine running, vehicle stationary (continued)

Trip computer shows selected function with instrument cluster 0 263 220 013, .. 014

Canada	USA	
0 km/h	AVE MPH	= actual value as of last reset
FUEL Range	FUEL Range	= distance that can still be covered calculated according to the average consumption over the last 30 km and the remaining contents in tank

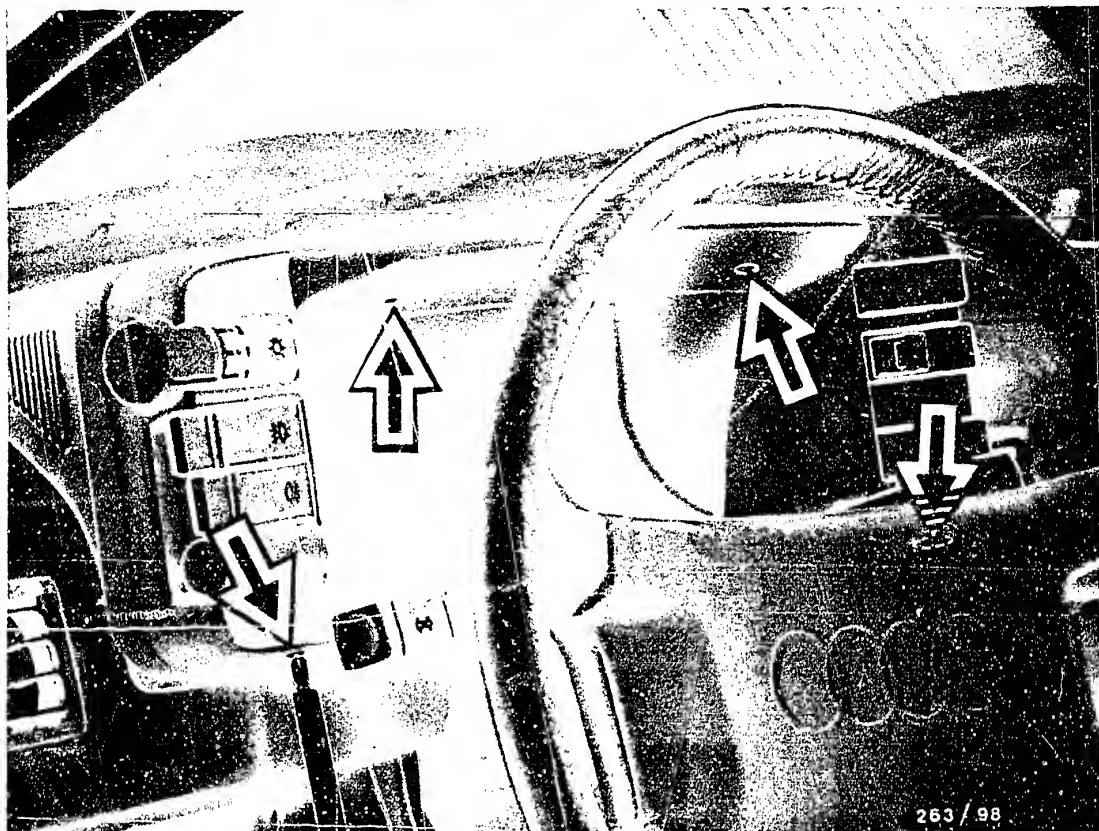


Functional test with ignition ON, engine running,
vehicle stationary (continued)

Trip computer shows selected function with instrument
cluster 0 263 220 013, .. 014

Canada	USA	
ELPSD TIME	ELPSD TIME	= pure driving time without pauses since the last reset up to max. 23 : 59 hours.
Ø 1/100 km	MPG AVE	= average consumption is stored when ignition off. Allowable indication range after reset in Canada 1.0...51.0 1/100 km USA 235.2 ... 4.6 MPG





7.4 Removal of instrument cluster

Remove four recessed-head screws (see picture, arrows).

Take off cover of instrument cluster.



After removing cover, disconnect plugs from control buttons.

Frame with control buttons can now be removed.

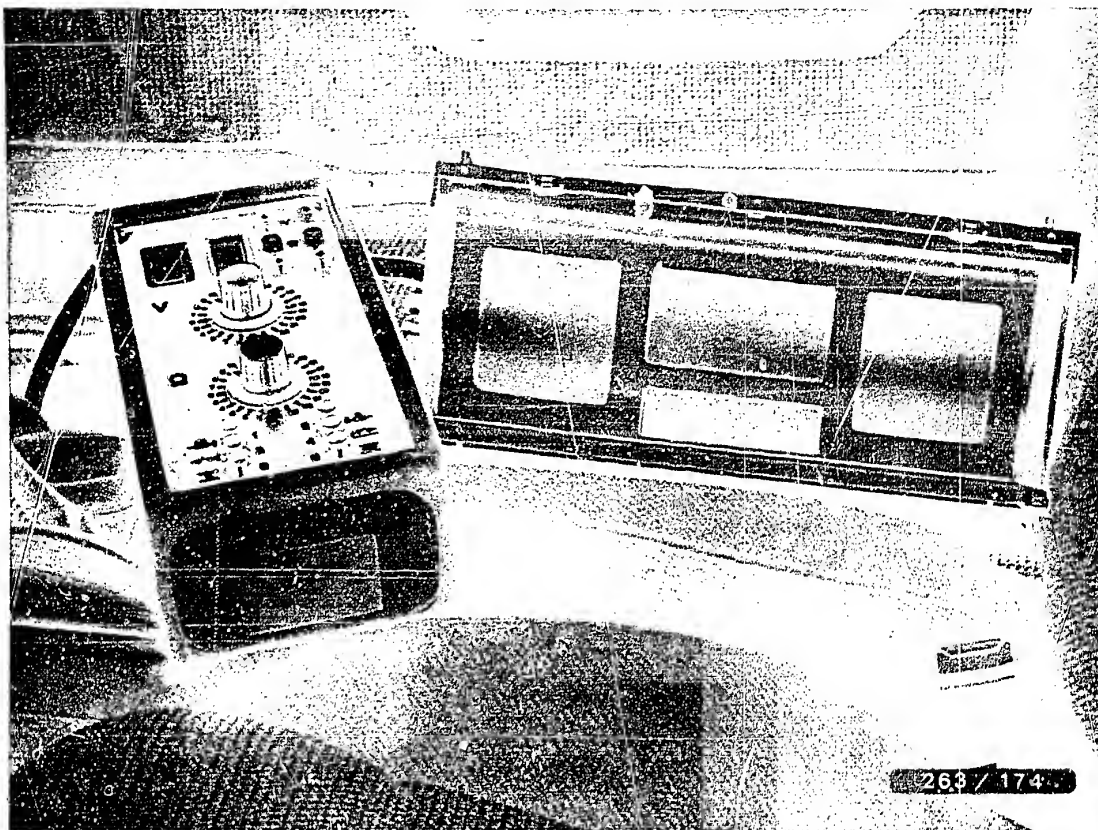
Plugs are color-coded and cannot be mixed up when re-assembling.

Remove fastening screws (recess-head screws) on left and right on instrument cluster.

Hinge up instrument cluster and disconnect 35-pin plug.

To do this, using thumbs, carefully raise latching hook of wiring-harness plug and, with blade of screwdriver, raise 35-pin plug.





- 1 = Connecting plug for the adapter lead plugged on the 35-pole connector of the vehicle wiring harness.
- 2 = Instrument cluster with the 35-pole connector for the adapter lead plugged on it
- 3 = Analog multimeter
- 4 = Universal test adapter with adapter lead KDES 0005 connected to it


7.5 Connecting the universal test adapter



8. Trouble-shooting program

The detailed trouble-shooting program below is intended to enable the workshop employees, using the universal test adapter 0 648 101 801 and suitable test equipment, to detect quickly the causes for defects on the instrument cluster, the wiring harness, and sensors. The step-by-step approach adopted in this trouble-shooting program makes it possible for such faults to be detected quickly even by workshop employees who have had little experience or practice on the vehicle.



Test step 1		
Operation	Reading	Testing
Program switch setting "V"	<div style="text-align: center;">  1 </div>	<u>Component:</u> Connection from vehicle ground to the instrument cluster, Pin 21/22
Program switch setting "Ω"		<u>Operation:</u> Measurement of resistance, continuity
Test equipment Universal test adapter * Multimeter *		<u>Malfunction:</u> Reading $\infty \Omega$
Range of measurement: $\Omega \times 1$		
<u>Connection:</u> Blue test socket <u>Operation in vehicle:</u>		

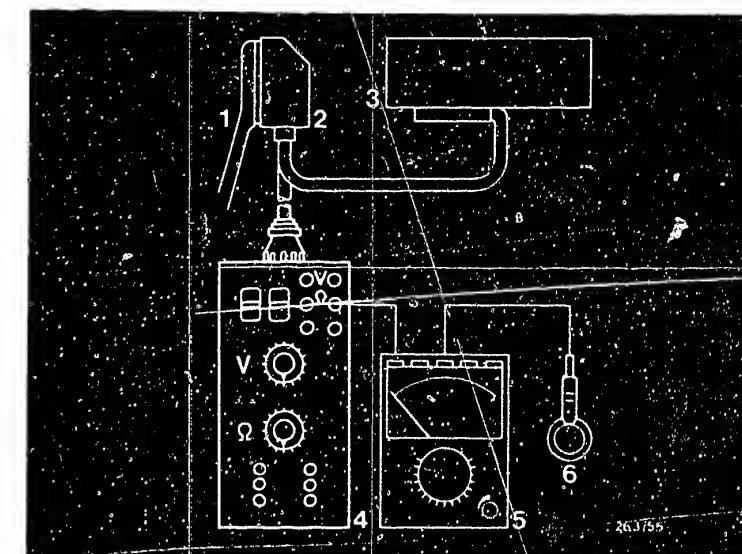
* Note:

For this test step, connect the ohmmeter to only one ohm socket on the universal test adapter. Connect the other lead of the ohmmeter to vehicle ground (see top picture).

Possible defects:

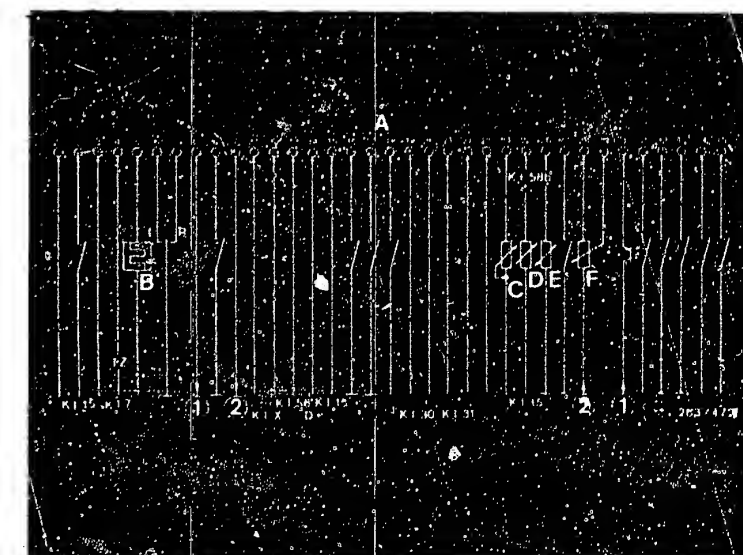
There is a break or contact resistance in the lead from the central ground to pin 21/22.


Eliminate the break or contact resistance for the ground lead to Terminal 21/22 of the instrument cluster.

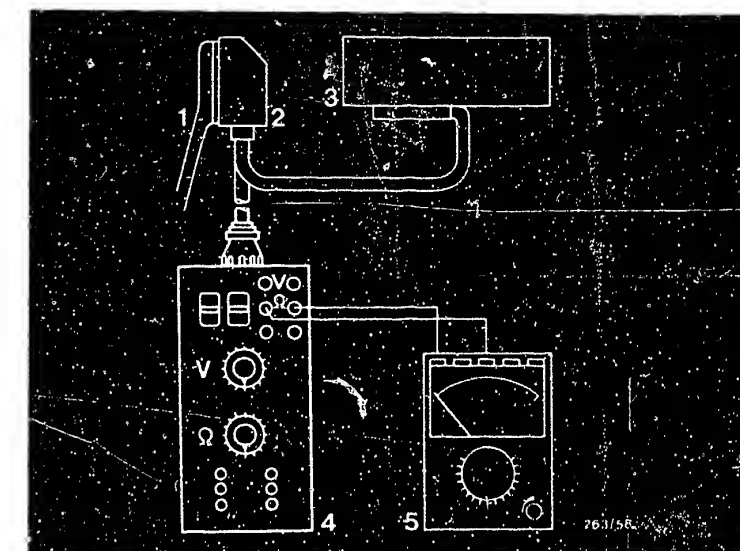


- 1 = 35-pole connector to the vehicle wiring harness
- 2 = Adapter lead
- 3 = Instrument cluster
- 4 = Universal test adapter
- 5 = Multimeter
- 6 = Cigarette lighter

Partial connection diagram for the vehicle wiring harness to the instrument cluster



Test step 2			
Operation		Reading	Testing
<u>Program switch setting "V"</u>		On the multimeter: approx. 0...10 Ω	<u>Component:</u> Connection from vehicle ground to instrument cluster pin 1 Encoding KE2/KE3
<u>Program switch setting "Ω"</u>			6
<u>Test equipment:</u> Universal test adapter Multimeter			<u>Operation:</u> Measurement of resistance, continuity
<u>Range of measurement:</u> Ω x 1			<u>Malfunction:</u> Reading ∞ Ω
<u>Connection:</u> Blue test socket			
<u>Operation in vehicle:</u> _____			



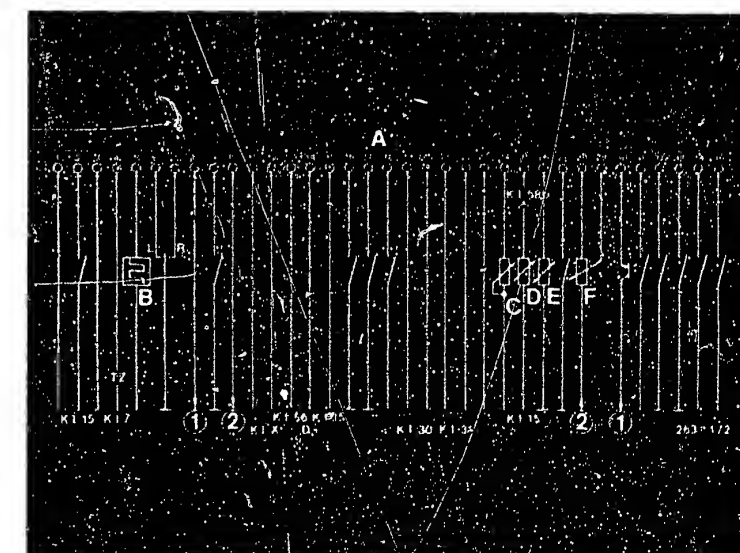
- 1 = 35-pole connector to the vehicle wiring harness
- 2 = Adapter lead
- 3 = Instrument cluster
- 4 = Universal test adapter
- 5 = Multimeter


Partial connection diagram for the vehicle wiring harness to the instrument cluster

Possible defects:

There is a break or contact resistance in the lead from the central ground to pin 1.

Eliminate the break or contact resistance to pin 1 of the instrument cluster.



Test step 3			
Operation		Reading	Testing
<u>Program switch setting "V"</u>		On the multimeter:	<u>Component:</u>
<u>Program switch setting "Ω"</u>		7	<u>Temperature sensor for coolant</u> Pin 26
<u>Test equipment:</u> Universal test adapter Multimeter		R_{20} = approx. 1000 Ω R_{40} = approx. 500 Ω R_{60} = approx. 187...247Ω R_{90} = approx. 75... 97Ω	<u>Operation:</u> Measurement of resistance
<u>Range of measurement:</u> Ω x 10		R_{110} = approx. 44... 58Ω R_{120} = approx. 37... 45Ω	<u>Malfunction:</u> 0 Ω (short-circuit) ∞ Ω (break)
<u>Connection:</u> Blue test socket			
<u>Operation in vehicle:</u> Ignition OFF			
<u>Additional operation:</u> Disconnect plug on the instrument cluster.			

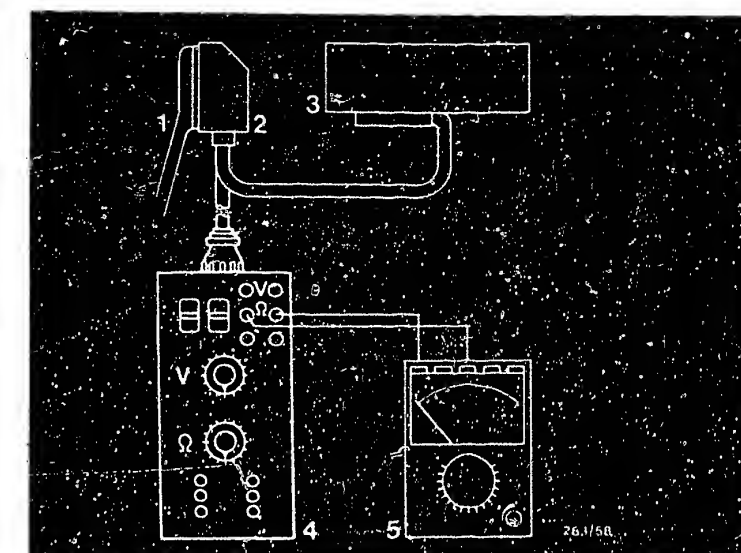
Possible defects:

Broken off or short-circuited lead on temperature sensor.
Break on lead to the instrument cluster.
Temperature sensor defective.

Note on measurement: R₆₀ means resistance at 60°C

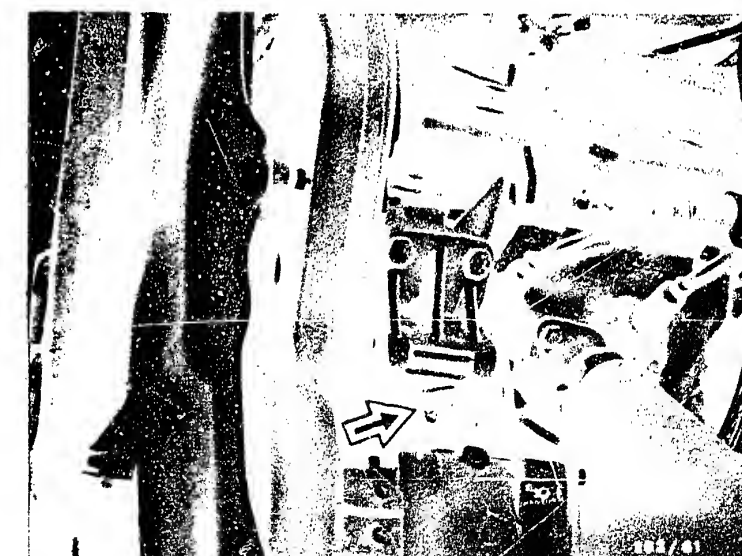
R₉₀ at 90°C, etc.

Take out and replace the leads to the temperature sensor or the sensor itself.
Take out and replace the leads to the instrument cluster Pin 26.



- 1 = 35-pole connector to the vehicle wiring harness
- 2 = Adapter lead
- 3 = Instrument cluster
- 4 = Universal test adapter
- 5 = Multimeter

Temperature sensor connection (arrow)



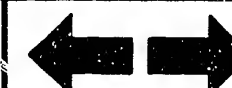
C21


Trouble-shooting
Audi



C22

Trouble-shooting
Audi

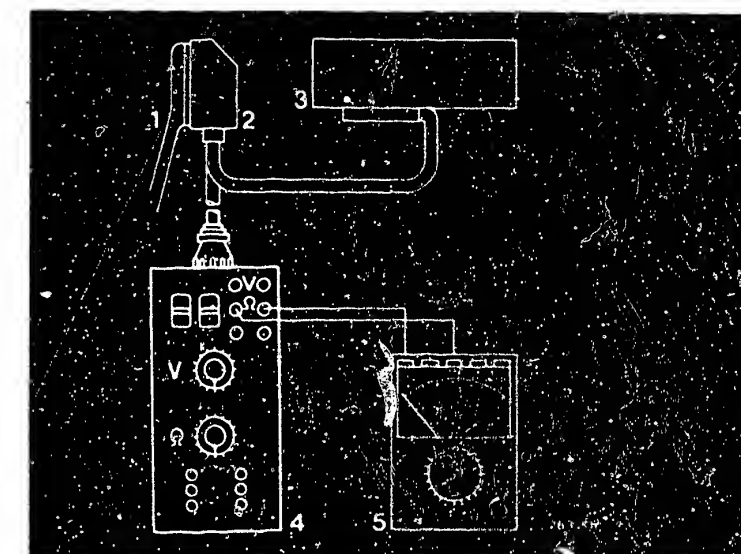


Test step 4			
Operation		Reading	Testing
Program switch setting "V"		On the multimeter: $R_{\text{empty}} = \text{approx. } 283 \Omega$ $R_{\text{full}} = \text{approx. } 40 \Omega$	<u>Component:</u> Tank sensor Pin 24
Program switch setting "Ω"	8		
Test equipment: Universal test adapter Multimeter			<u>Operation:</u> Measurement of resistance
Range of measurement: $\Omega \times 10$			<u>Malfunction:</u> No reading or incorrect reading
Connection: Blue test socket			
<u>Operation in vehicle:</u> _____			
Additional operation: Disconnect plug on the instrument cluster.			

Possible defects:

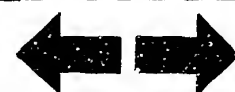
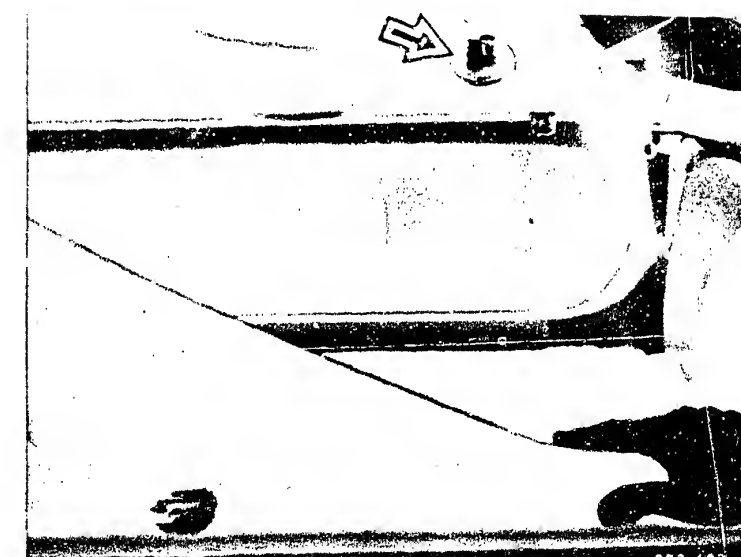
There is a break or contact resistance in the lead to the tank sensor.
Pin Term.24 of the instrument cluster is defective.
Tank sensor is defective.


Take out and replace defective parts, such as the lead to the tank sensor or the tank sensor itself.

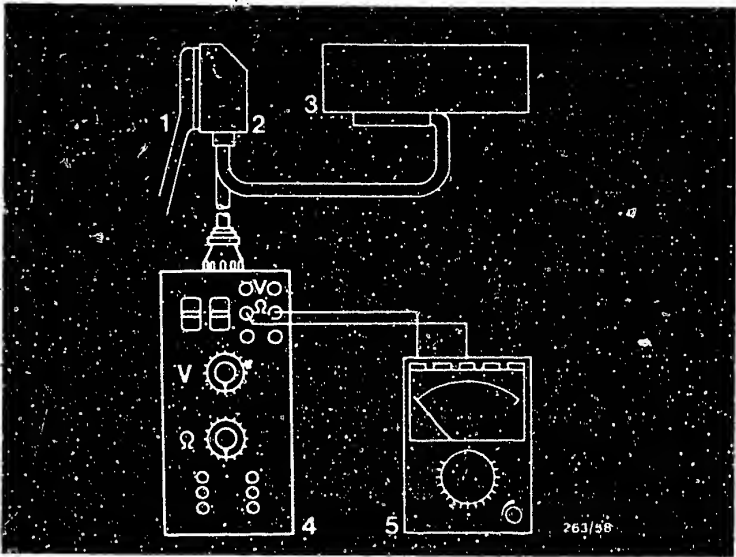


- 1 = 35-pole connector to the vehicle wiring harness
- 2 = Adapter lead
- 3 = Instrument cluster
- 4 = Universal test adapter
- 5 = Multimeter

Tank sensor (arrow)
(accessible from the luggage compartment)

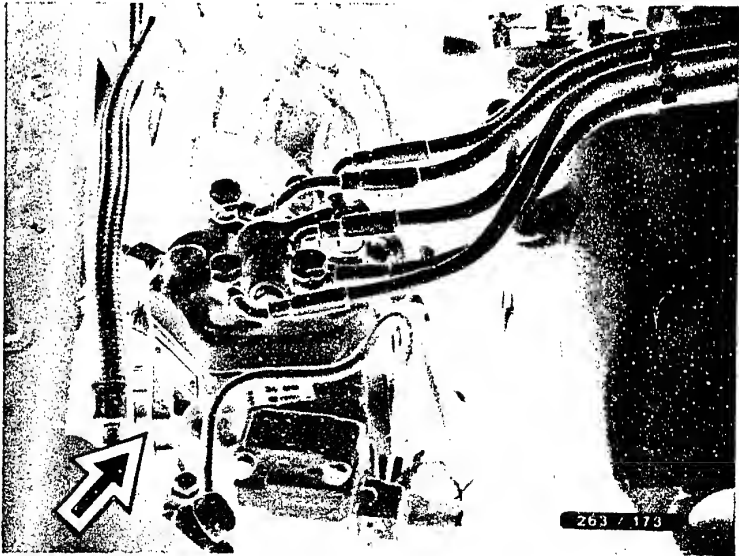


Test step 5			
Operation		Reading	Testing
<u>Program switch setting "V"</u>		On the multimeter: approx. 0...10 Ω	<u>Component:</u> Ground lead from the fuel-consumption sensor Pin 28
<u>Program switch setting "Ω"</u>	11		
<u>Test equipment:</u> Universal test adapter Multimeter			<u>Operation:</u> Measurement of continuity
<u>Range of measurement:</u> Ω x 1			<u>Malfunction:</u> ∞ Ω if there is a break in the lead
<u>Connection:</u> Blue test socket			
<u>Additional operation:</u> Plug connected to instrument cluster.			



- 1 = 35-pole connector to the vehicle wiring harness
- 2 = Adapter lead
- 3 = Instrument cluster
- 4 = Universal test adapter
- 5 = Multimeter

Installation position of the fuel-consumption sensor (arrow)



Possible defects:

There is a break in the ground lead to the fuel-consumption sensor.

The ground lead to Terminal 28 above the instrument cluster is missing.

Eliminate the break in the lead.

Test step 6

Operation

Program switch
position "V"



Program switch
position "Ω"

20

Measuring equipment:
Universal test adapter

Connection:
Blue test socket

Operation in vehicle:
Ignition ON

Addition operation:

Plug connected on instrument
cluster

Reading

on instrument
cluster

Temperature display
at hot, flashing

Ohm sockets on
adapter jumped

Testing

Component:

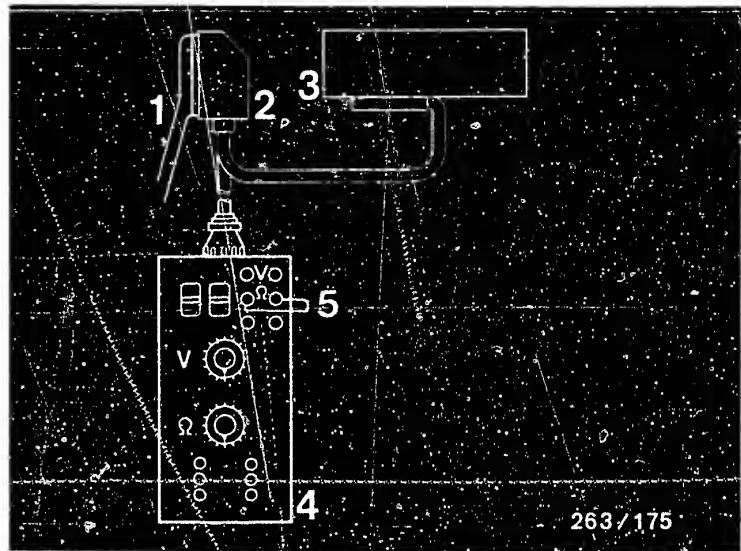
Connection between vehicle
ground and instrument cluster
terminal 27

Operation:

Coolant temperature display

Malfunction:

Temperature display does not
move to hot, flashing.



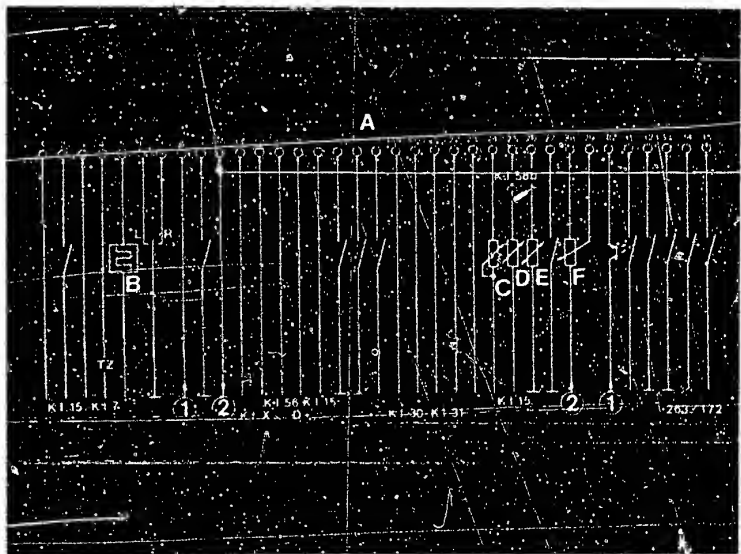
- 1 = 35-pin connector on vehicle wiring harness
- 2 = Adapter lead
- 3 = Instrument cluster
- 4 = Universal test adapter
- 5 = Test lead

Partial terminal diagram of vehicle
wiring harness to instrument
cluster

Possible faults:

Thermo-switch in engine block defective.

Open circuit in lead between thermo-switch and instrument cluster terminal 27.



D3

Trouble-shooting

Audi



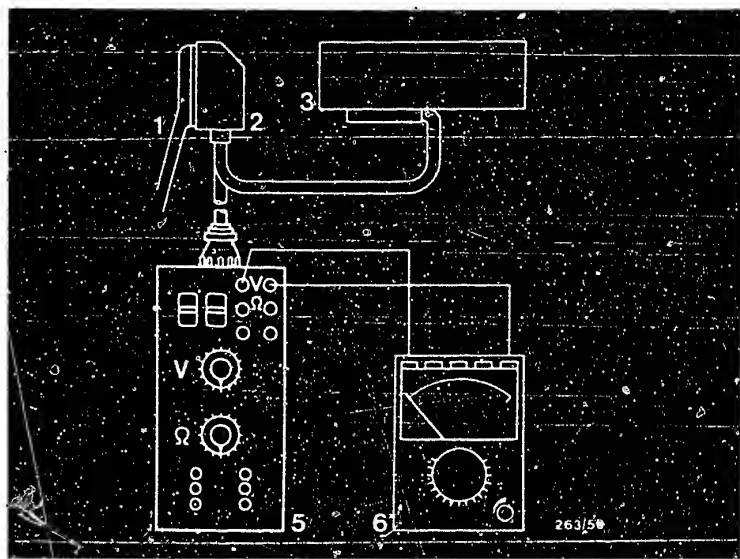
D4

Trouble-shooting

Audi

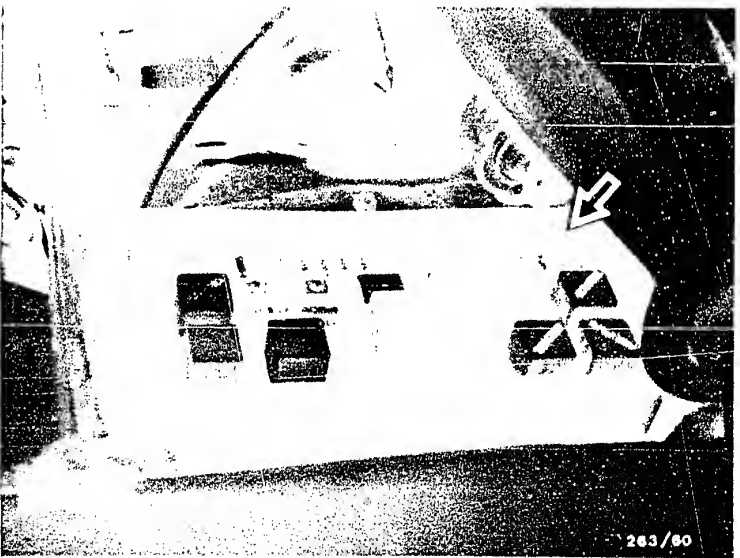


Test step 7			
Operation		Reading	Testing
Program switch setting "V"	1	On the multimeter: Battery voltage	<u>Component:</u> Voltage supply for instrument cluster Pin 19/20
Program switch setting "Ω"	--		<u>Operation:</u> Measurement of voltage
Test equipment: Universal test adapter Multimeter			<u>Malfunction:</u> No voltage present
Range of measurement: 0 ... 15 V			
Connection: Red test socket = + Black test socket = -			
<u>Operation in vehicle:</u> _____			



- 1 = 35-pole connector to the vehicle wiring harness
- 2 = Adapter lead
- 3 = Instrument cluster
- 5 = Universal test adapter
- 6 = Multimeter

Fuse box in the engine compartment



Possible defects:

The lead from Term. 30 has no connection to Pin 19/20 on the instrument cluster.

Fuse No. 4 (15 A) in the fuse box (see Figure at bottom) has blown.

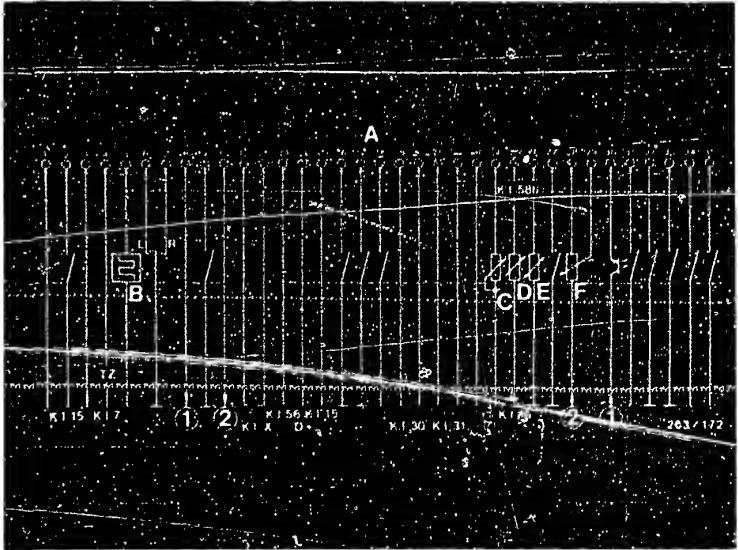
Eliminate break in the power supply lead to Pin 19/20.

If necessary, take out and replace fuse No. 4 (15 A).

Test step 8			
Operation		Reading	Testing
Program switch setting "V"	3	On the multimeter: Battery voltage	Component: Power supply for instrument cluster via ignition lock Pin 15
Program switch setting "Ω"	--		Operation: Measurement of voltage
Test equipment: Universal test adapter Multimeter			Malfunction: No voltage after "ignition ON" Battery voltage too low
Range of measurement: 0 ... 15 V			
Connection: Red test socket = + Black test socket = -			
Operation in vehicle: Ignition ON			

- 1 = 35-pole connector to the vehicle wiring harness
- 2 = Adapter lead
- 3 = Instrument cluster
- 5 = Universal test adapter
- 6 = Multimeter

Partial connection diagram for the vehicle wiring harness to the instrument cluster

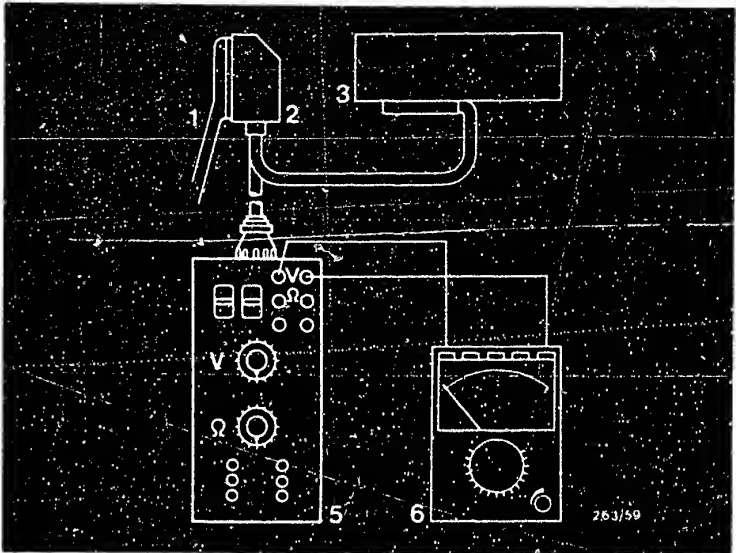


Possible defects:

The lead from the ignition lock Term. 15 to the instrument cluster Pin 15 has a break or contact resistance.

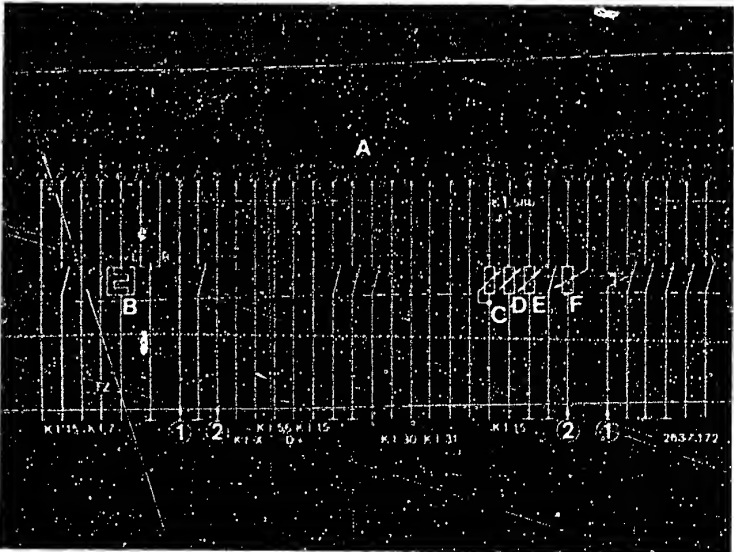
Eliminate the break and the contact resistances in the power supply lead from Terminal 15 to the instrument cluster Pin 15.

Test step 9			
Operation		Reading	Testing
<u>Program switch setting "V"</u>	4	On the multimeter: 1. approx. 12 V 2. approx. 0 V	<u>Component:</u> Power supply for instrument cluster via ignition lock Pins 11/12
<u>Program switch setting "Ω"</u>	--		
<u>Test equipment:</u> Universal test adapter Multimeter			<u>Operation:</u> Measurement of voltage
<u>Range of measurement:</u> 0 ... 15 V			<u>Malfunction:</u> No voltage after "ignition ON" Battery voltage too low
<u>Connection:</u> Red test socket = + Blue test socket = -			
<u>Operation in vehicle:</u> 1. Ignition ON 2. Activate starting motor briefly			

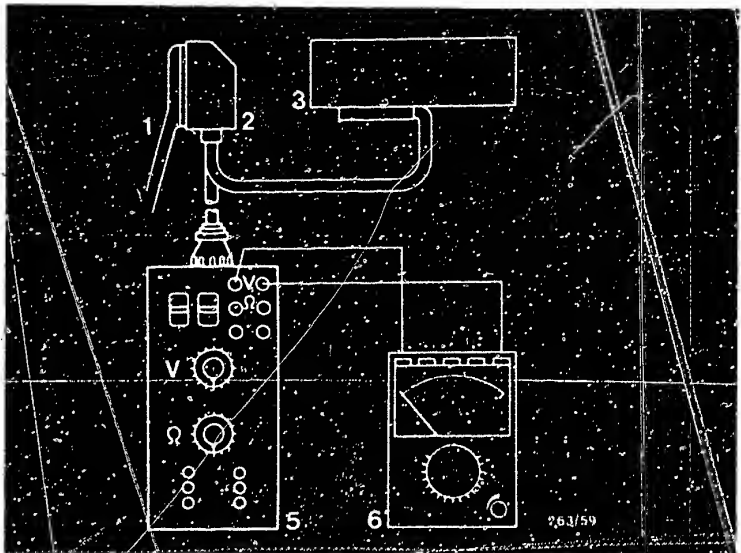


- 1 = 35-pole connector to the vehicle wiring harness
- 2 = Adapter lead
- 3 = Instrument cluster
- 5 = Universal test adapter
- 6 = Multimeter

Partial connection diagram for the vehicle wiring harness to the instrument cluster

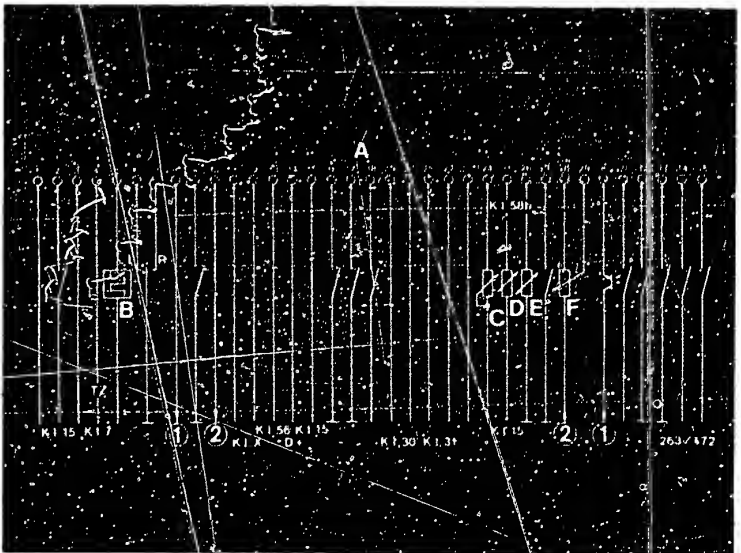


Test step 10			
Operation		Reading	Testing
Program switch setting "V"	8	On the multimeter: $> 1,5 \text{ V} \leq 12 \text{ V}$	Component: Ignition trigger box Pin 4
Program switch setting "Ω"	--		
Test equipment: Universal test adapter Multimeter			Operation: Measurement of voltage Engine speed signal
Range of measurement: 0 ... 5 V			
Connection: Red test socket = + Blue test socket = -			Malfunction: No voltage
Operation in vehicle: Ignition ON			
Additional operation: Engine idling.			



- 1 = 35-pole connector to the vehicle wiring harness
- 2 = Adapter lead
- 3 = Instrument cluster
- 5 = Universal test adapter
- 6 = Multimeter

Partial connection diagram for the vehicle wiring harness to the instrument cluster



Possible defects:

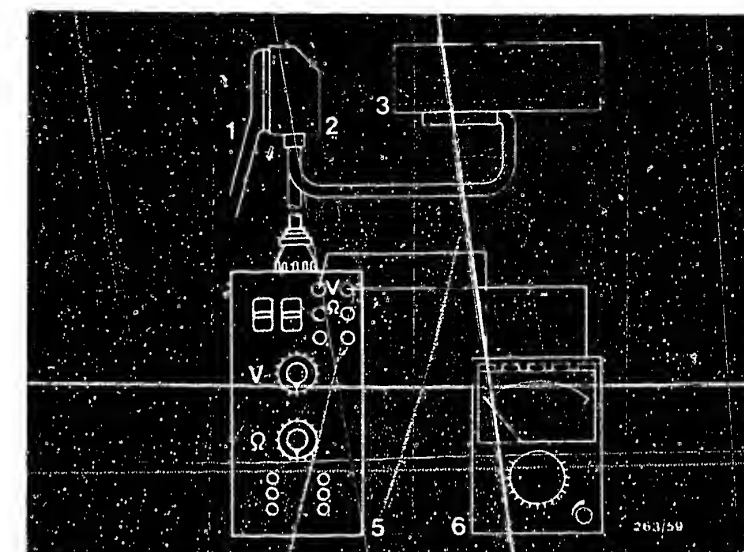
Break in lead or short-circuit at Pin 4 on the instrument cluster.

The plug at Term. 7 of the ignition trigger box is not making contact.

Note:

The ignition trigger box is located at the top in the glove compartment.
Eliminate break in lead or short-circuit.

Test step 11			
Operation		Reading	Testing
Program switch setting "V"	9	On the multimeter: approx. 12 V	Component: Oil-pressure switch Pin 17
Program switch setting "Ω"	--		
Test equipment: Universal test adapter Multimeter			Operation: Opens at oil pressure of 0.35 bar
Range of measurement: 0 ... 15 V			
Connection: Red test socket = + Blue test socket = -			Malfunction: At 0 V
Operation in vehicle: Ignition ON Start the engine			
Additional operation: Have engine run until oil pressure rises above 0.35 bar			



- 1 = 35-pole connector to the vehicle wiring harness
- 2 = Adapter lead
- 3 = Instrument cluster
- 5 = Universal test adapter
- 6 = Multimeter

Oil-pressure switch next to the oil dipstick



Possible defects:

Break in lead. The plug on the oil-pressure switch has slipped off - there is a break at Pin 17 on the instrument cluster.
The oil-pressure switch is defective.

Eliminate open circuit, or replace oil pressure switch.

D 13

Trouble-shooting
Audi

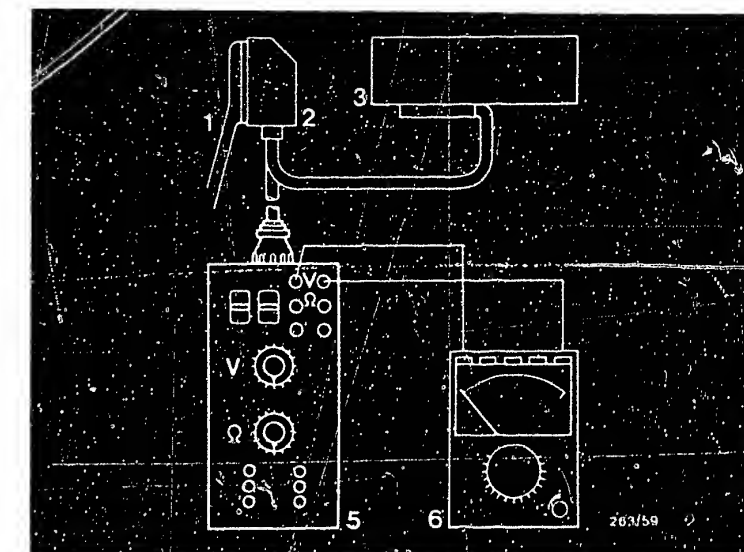


D 14

Trouble-shooting
Audi



Test step 12			
Operation		Reading	Testing
Program switch setting "V"	10	On the multimeter: 0V→approx.5V→0V or approx.5V→0V→ approx.5V	<u>Component:</u> Displacement sensor on the Cardan shaft Pin 5
Program switch setting "Ω"	--		<u>Operation:</u> Measurement of voltage (Pulsing EC voltage)
Test equipment: Universal test adapter Multimeter			<u>Malfunction:</u> At 0 V constant, or 6 V constant
Range of measurement: 0 ... 15 V			
Connection: Red test socket = + Black test socket = -			
Operation in vehicle: Ignition ON			
Additional operation: Move vehicle approx. 1.0 m.			



- 1 = 35-pole connector to the vehicle wiring harness
- 2 = Adapter lead
- 3 = Instrument cluster
- 5 = Universal test adapter
- 6 = Multimeter

Displacement sensor (arrow) on the front differential



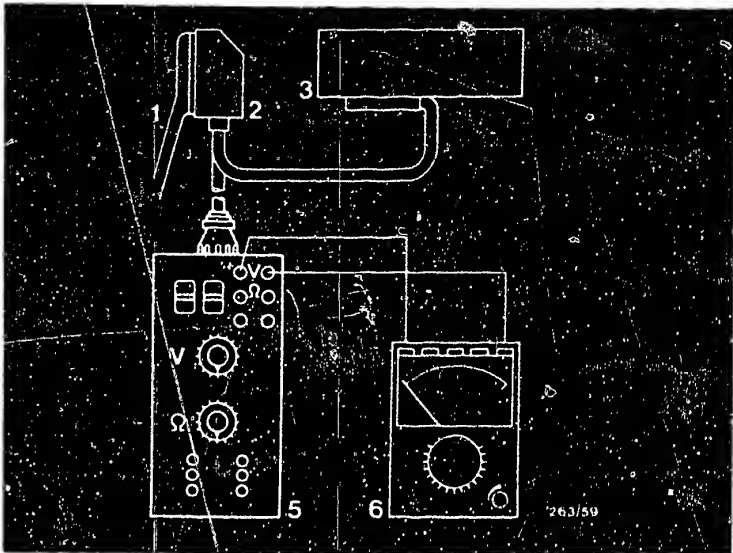
Possible defects:

No connection to Pin 5 on the instrument cluster.
The lead has a short-circuit or a break.
Displacement sensor defective.

Take out and replace defective leads or displacement sensor.

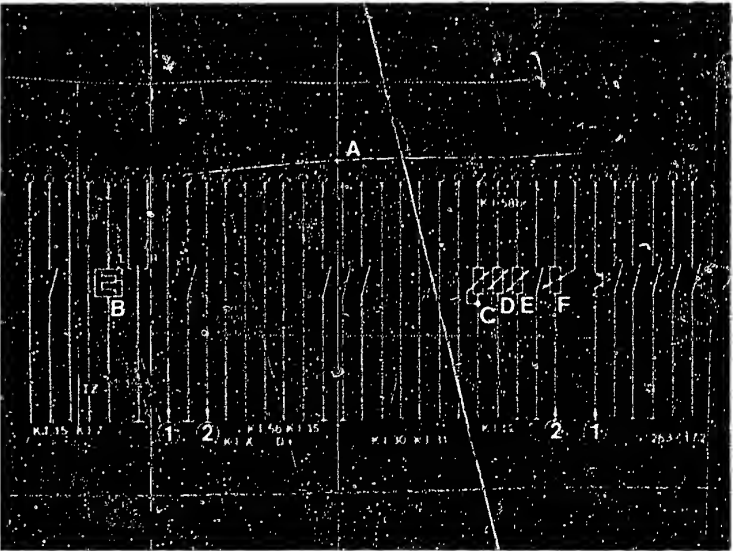


<u>Test step 13</u>			
<u>Operation</u>		<u>Reading</u>	<u>Testing</u>
<u>Program switch setting "V"</u>	11	On the multimeter: 7 - 8 V	<u>Component:</u> Supply voltage for fuel-consumption sensor Pin 10
<u>Program switch setting "Ω"</u>	--		
<u>Test equipment:</u> Universal test adapter Multimeter			<u>Operation:</u> Measurement of voltage
<u>Range of measurement:</u> 0 ... 5 V			<u>Malfunction:</u> With voltage less than 7 or more than 8 V
<u>Connection:</u> Red test socket = + Black test socket = -			
<u>Operation in vehicle:</u> Ignition ON			



- 1 = 35-pole connector to the vehicle wiring harness
- 2 = Adapter lead
- 3 = Instrument cluster
- 5 = Universal test adapter
- 6 = Multimeter

Partial connection diagram for the vehicle wiring harness to the instrument cluster



Test step 14

Operation

Program switch
setting "V"

12

Program switch
setting "Ω"

--

Test equipment:
Universal test adapter
Multimeter

Range of
measurement: 0 ... 5 V

Connection:

Red test socket = +
Black test socket = -

Operation in the vehicle:
Start the engine

Reading

On the multimeter:

0 ... 8 V

Depending on the
engine speed, the
voltage at the
fuel-consumption
sensor fluctuates
between

0 and 8 V

Testing

Component:

Measured value of the fuel-
consumption sensor

Pin 29

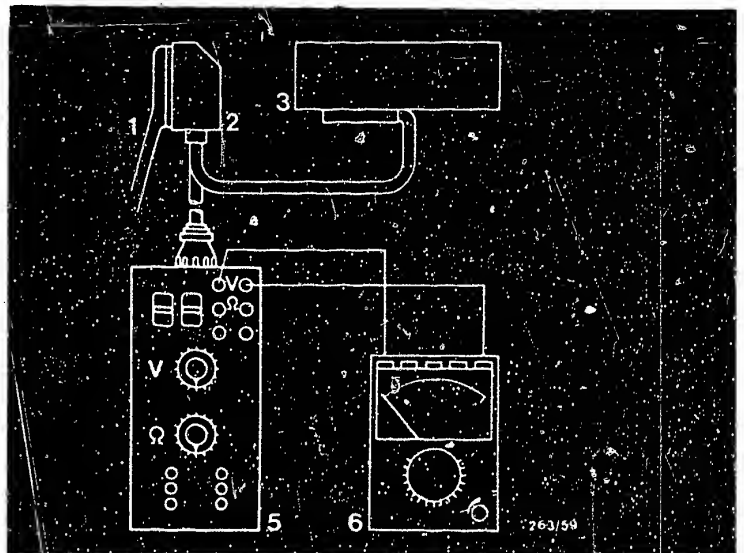
Operation:

Measurement of voltage

Malfunction:

Voltage always 0 V or
8 V

Reading for consumption
not O.K.



- 1 = 35-pole connector to the vehicle wiring harness
- 2 = Adapter lead
- 3 = Instrument cluster
- 5 = Universal test adapter
- 6 = Multimeter

Possible defects:

The lead to Pin 29 on the instrument cluster is not connected to the fuel-consumption sensor.

Take out and replace a defective lead.

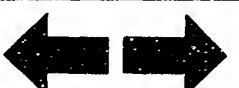
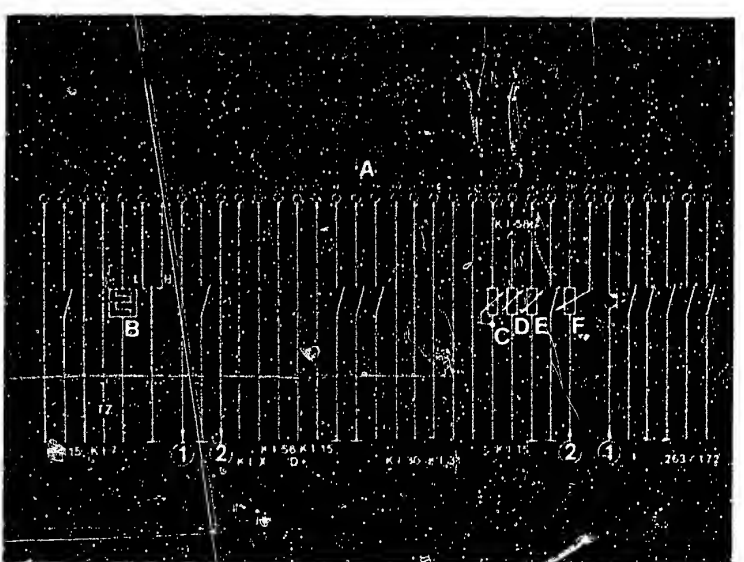
Adjustment of the fuel-consumption sensor.

With the sensor plate in its zero position (i.e., the upper edge of the sensor plate flush with the start of the cone), adjust the fuel-consumption sensor (potentiometer) in such a way that the voltage at the measuring instrument is exactly 0 Volts (+ 0.05 V).

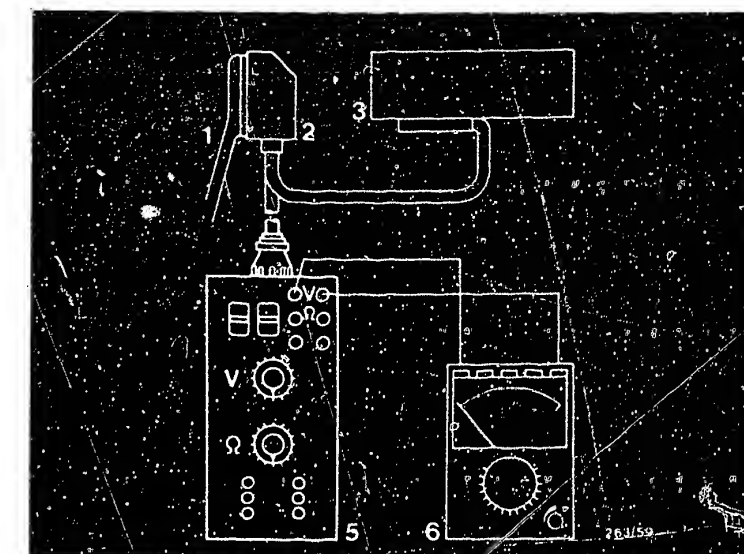
The voltage must increase immediately when the sensor plate is deflected only slightly.

Tighten the fastening screws to a tightening torque of 1.5 ... 2.0 Nm, and secure with locking paint.

Partial connection diagram for the vehicle wiring harness to the instrument cluster



Test step 15			
Operation		Reading	Testing
Program switch setting "V"	13	On the multimeter: When the rocker on the left is activated, the voltage goes from approx. 2,5...1,5 V to 0 V	<u>Component:</u> Left-hand rocker button for trip computer Pin 6
Program switch setting "Ω"	--		<u>Operation:</u> Measurement of voltage
<u>Test equipment:</u> Universal test adapter Multimeter			<u>Malfunction:</u> If the voltage does not return to 0 V or is always 0 V.
<u>Range of measurement:</u> 0 ... 5 V			
<u>Connection:</u> Red test socket = + Blue test socket = -			
<u>Operation in the vehicle:</u> Ignition ON			
<u>Additional function:</u> Press left-hand rocker button			



- 1 = 35-pole connector to the vehicle wiring harness
- 2 = Adapter lead
- 3 = Instrument cluster
- 5 = Universal test adapter
- 6 = Multimeter

Partial connection diagram for the vehicle wiring harness to the instrument cluster

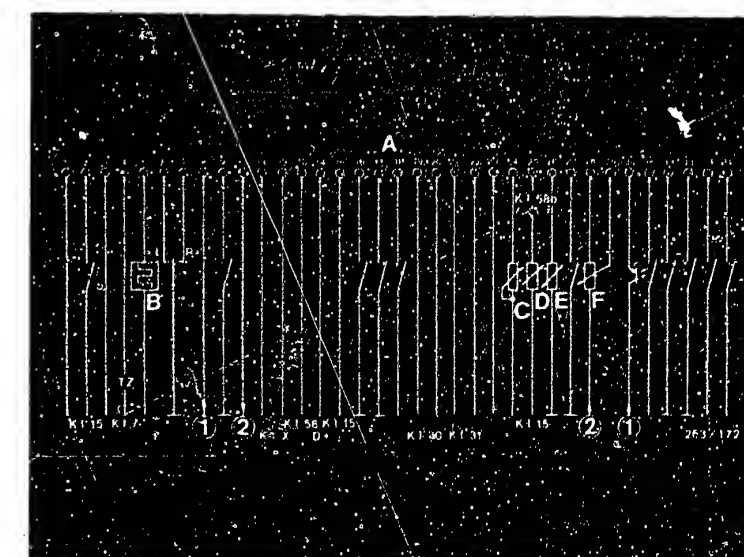
Possible defects:

Open circuit or short circuit to ground in lead from rocker button to ground. - Rocker button defective.

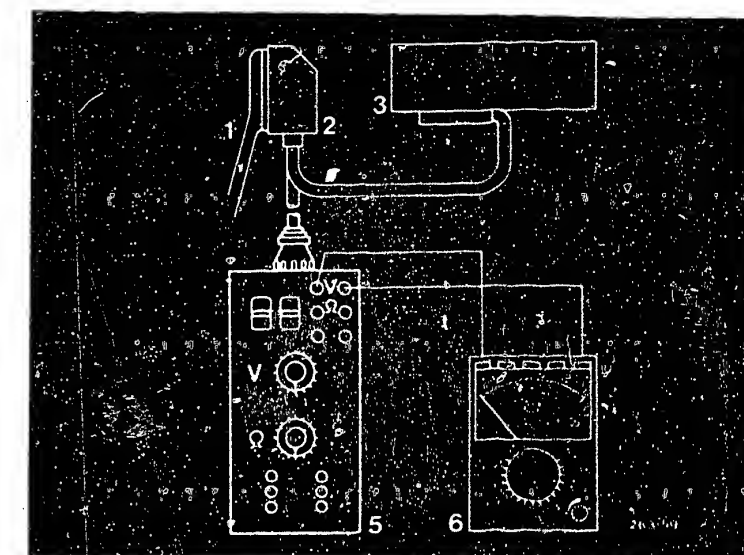
There are no 2,5 V being applied at Pin 6 of the instrument cluster.

There is a break in the lead from Pin 6 of the instrument cluster to the rocker switch.

Replace defective lead or rocker button.



Test step 16			
Operation		Reading	Testing
Program switch setting "V"	14	On the multimeter:	Component:
Program switch setting "Ω"	--	When the rocker switch on the right is activated, the voltage goes from	Right-hand rocker button for trip computer.
Test equipment: Universal test adapter Multimeter		2,5...1,5 V to 0 V	Pin 7
Range of measurement: 0 ... 5 V			Operation: Measurement of voltage
Connection: Red test socket = + Black test socket = -			Malfunction: If the voltage does not return to 0 V or is always 0 V.
Operation in the vehicle: Ignition ON			
Additional operation: Press right-hand rocker button			



- 1 = 35-pole connector to the vehicle wiring harness
- 2 = Adapter lead
- 3 = Instrument cluster
- 5 = Universal test adapter
- 6 = Multimeter

Partial connection diagram for the vehicle wiring harness to the instrument cluster

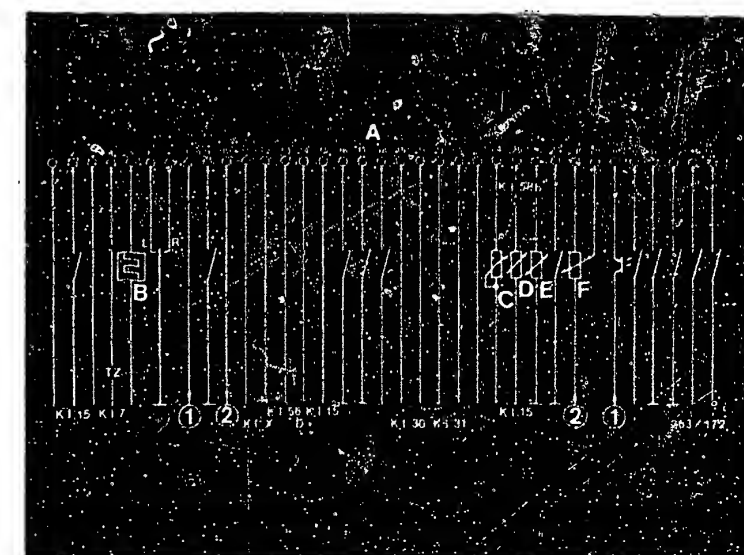
Possible defects:

Open circuit or short circuit to ground in lead from rocker button to ground. -
Rocker button defective.

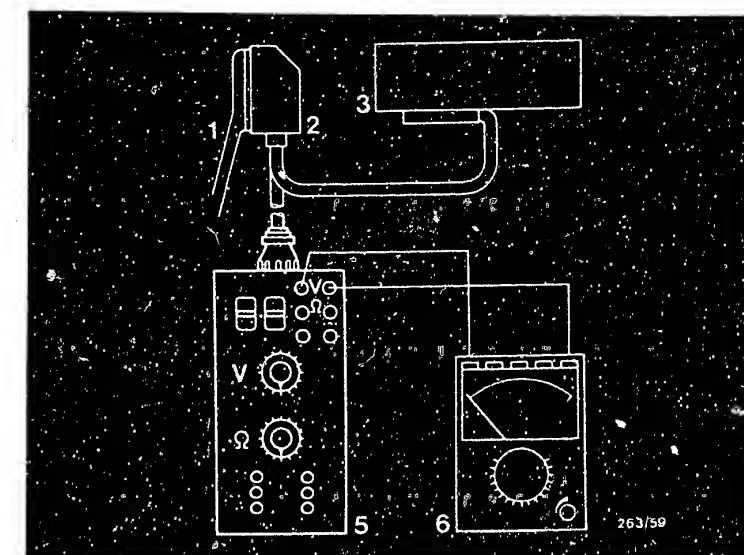
There are no 2,5 V being applied at pin 7 of the instrument cluster.

There is a break in the lead from Pin 7 of the instrument cluster to the rocker switch.

Replace defective lead or rocker button.



Test step 17			
Operation		Reading	Testing
<u>Program switch setting "V"</u>	15	On the multimeter: When the reset button is activated, the voltage returns from 3,5...4,5 V to 0 V	<u>Component:</u> Reset button Pin 9
<u>Program switch setting "Ω"</u>	--		<u>Operation:</u> Measurement of voltage
<u>Test equipment:</u> Universal test adapter Multimeter			<u>Malfunction:</u> If the voltage does not return to 0 V or is always 0 V.
<u>Range of measurement:</u> 0 ... 5 V			
<u>Connection:</u> Red test socket = + Black test socket = -			
<u>Operation in the vehicle:</u> Ignition ON			
<u>Additional operation:</u> Press reset button			



- 1 = 35-pole connector to the vehicle wiring harness
- 2 = Adapter lead
- 3 = Instrument cluster
- 5 = Universal test adapter
- 6 = Multimeter

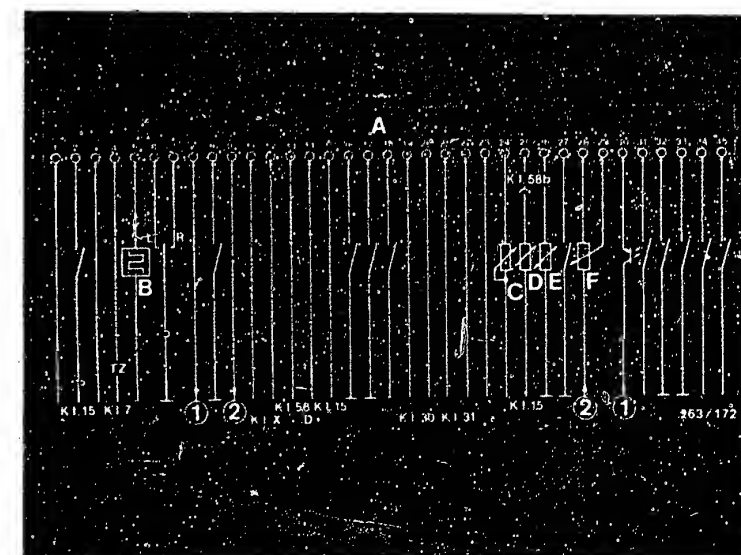
Partial connection diagram for the vehicle wiring harness to the instrument cluster

Possible defects:

There is a break in the lead from the reset button to ground.
The reset button is defective.
There are no 4,5 V being applied at Pin 9 of the instrument cluster.

The lead from Pin 9 of the instrument cluster to the reset button has a break.

Take out and replace a defective lead or reset button.



E1

Trouble-shooting
Audi



E2

Trouble-shooting
Audi



Test step 18

Operation

Program switch setting "V"

16

Program switch setting "Ω"

--

Test equipment:
Universal test adapter
Multimeter

Range of measurement: 0 ... 15 V

Connection:

Red test socket = +
Black test socket = -

Operation in the vehicle:
Ignition ON

Additional operation:
Press reduced-display button

Reading

On the multimeter:
When reduced-display button is pressed, voltage rises

from 0 V to 12 V.

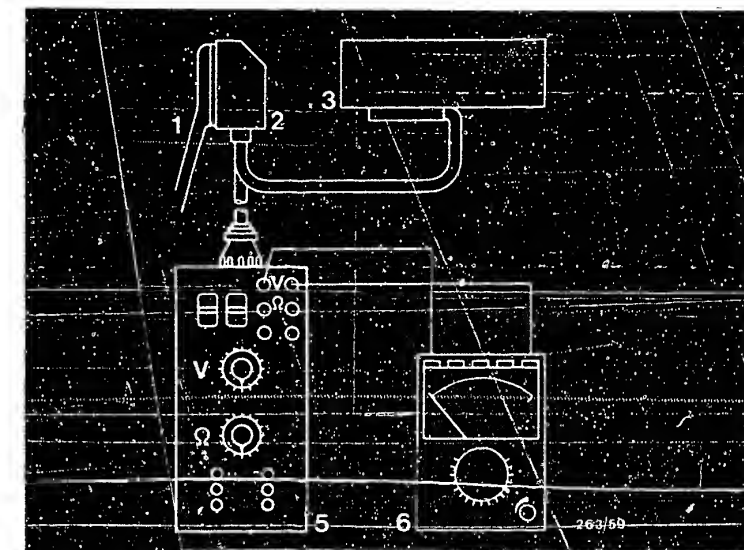
Testing

Component:
Button for reduced-display

Pin 2

Operation:
Measurement of voltage

Malfunction:
If the voltage does not rise to V_{battery}



- 1 = 35-pole connector to the vehicle wiring harness
- 2 = Adapter lead
- 3 = Instrument cluster
- 5 = Universal test adapter
- 6 = Multimeter

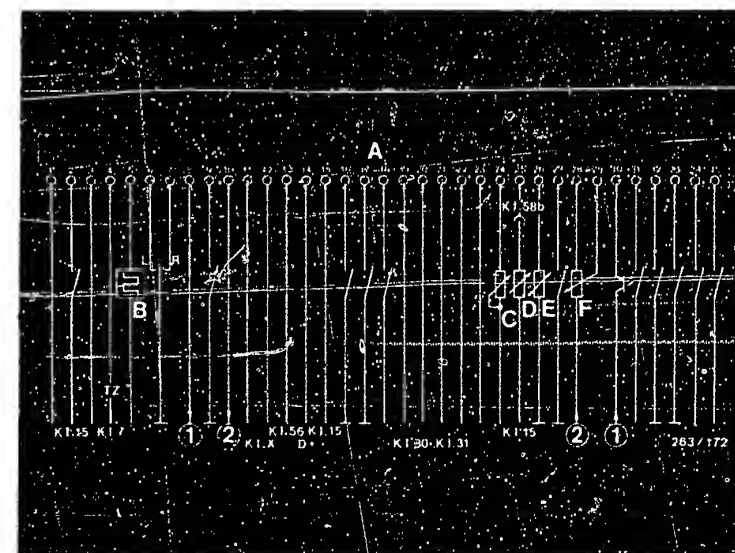
Partial connection diagram for the vehicle wiring harness to the instrument cluster

Possible defects:

The lead from the button for reduced display to Pin 15 has a break.
Button is defective.

The lead from Pin 2 of the instrument cluster to the button for reduced display has a break.

Take out and replace defective leads or button for reduced display.



E3

Trouble-shooting

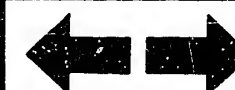
Audi



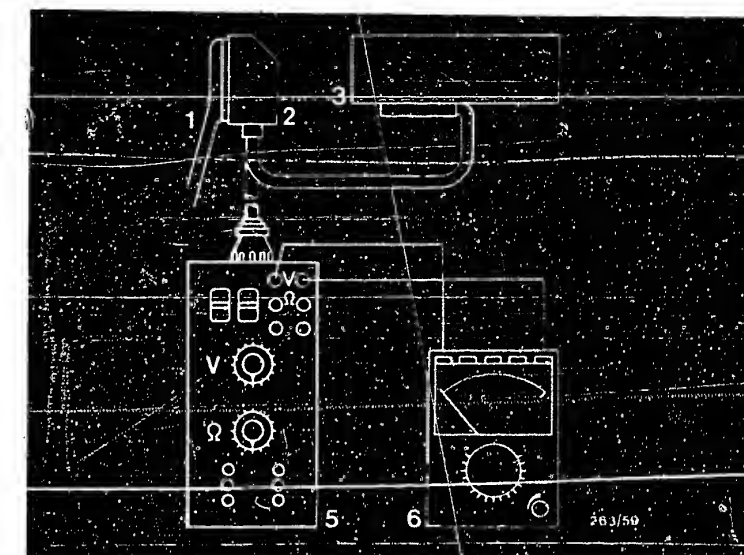
E4

Trouble-shooting

Audi



Test step 19			
Operation		Reading	Testing
<u>Program switch setting "V"</u>	17	On the multimeter: 9 - 12 V	<u>The display brightness control on the instrument cluster</u> Pin 25
<u>Program switch setting "Ω"</u>	--		
<u>Test equipment:</u> Universal test adapter Multimeter			
<u>Range of measurement:</u> 0 ... 15 V			
<u>Connection:</u> Red test socket = + Black test socket = -			
<u>Operation in the vehicle:</u> Activate brightness control			
			<u>Operation:</u> Measurement of voltage
			<u>Malfunction:</u> If the voltage does not change.



- 1 = 35-pole connector to the vehicle wiring harness
- 2 = Adapter lead
- 3 = Instrument cluster
- 5 = Universal test adapter
- 6 = Multimeter

Partial connection diagram for the vehicle wiring harness to the instrument cluster

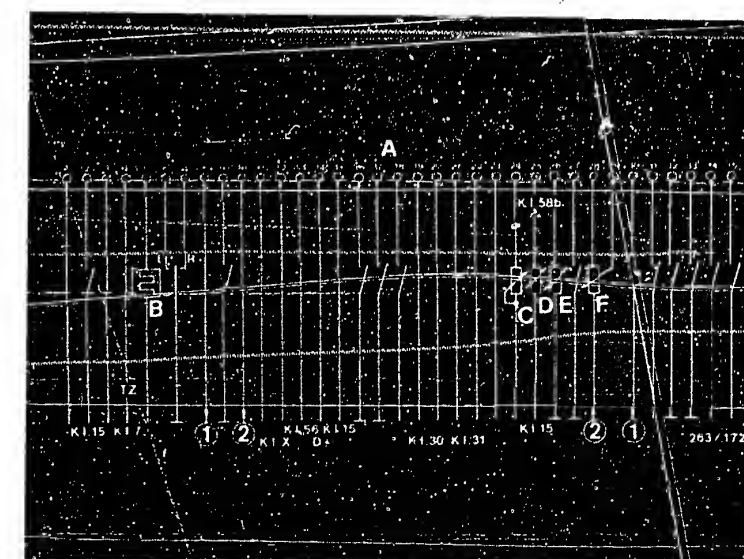
Possible defects:

The lead from the display brightness control (Term. 58b) to Pin 25 on the instrument cluster has a break or a short-circuit.

The display brightness control is defective.

The instrument cluster is defective.

Take out and replace a defective lead, display brightness control, or instrument cluster.



E5

Trouble-shooting

Audi



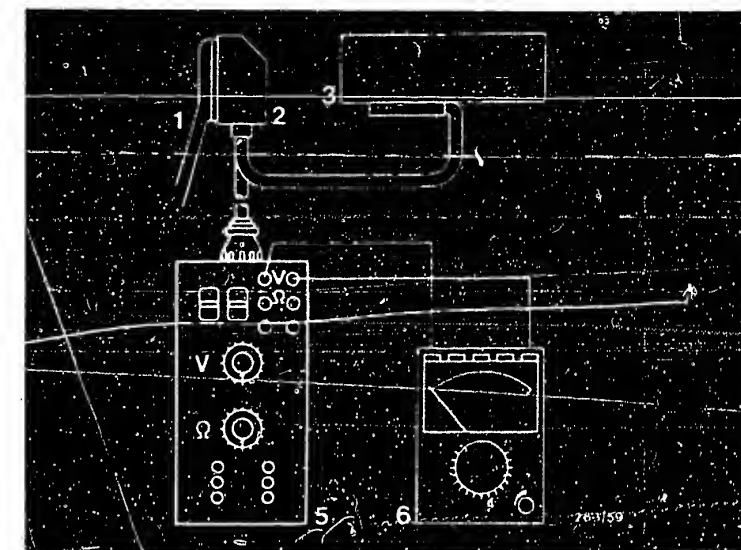
E6

Trouble-shooting

Audi



TEST STEP 20			
Operation		Reading	Testing
Program switch "V" to position:	18	On multimeter	Component: Encoding KE2/KE3 pin 1
		KE2 3 - 5 V KE3 0 V	
Program switch "Ω" to position:		-	
Measuring equipment: Universal test adapter multimeter			Operation: Voltage measurement
Measuring range: 0 ... 5 V			
Connection: Red test socket = + Black test socket = -			Malfunction: With KE2 no voltage With KE3 voltage > 0 V.
Operation in vehicle: Engine running			



- 1 = 35-pin connector on vehicle wiring harness
- 2 = Adapter lead
- 3 = Instrument cluster
- 5 = Universal test adapter
- 6 = Multimeter

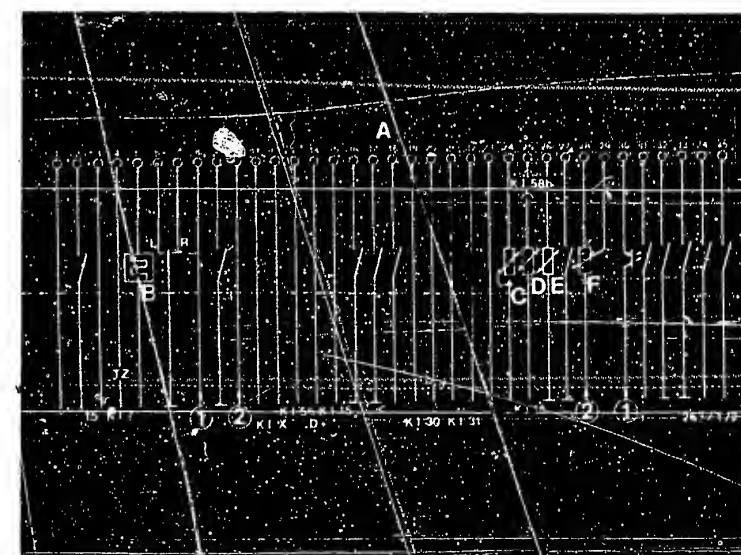
Terminal diagram - vehicle wiring harness to instrument cluster

Possible faults:

Open circuit in lead from KE control unit to 35-pin plug of instrument cluster pin 1.

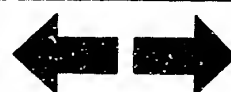
Instrument cluster defective.

Replace defective lead or instrument cluster.



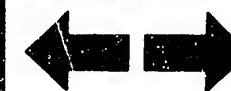
E7

Trouble-shooting
Audi

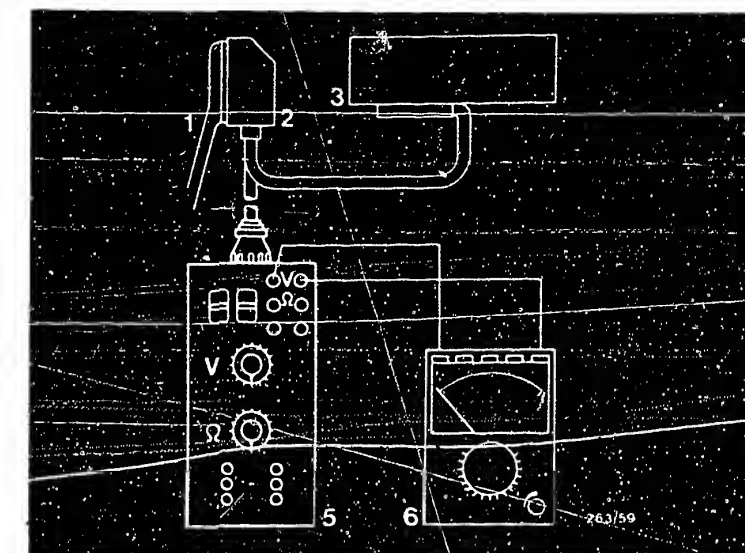


E8

Trouble-shooting
Audi

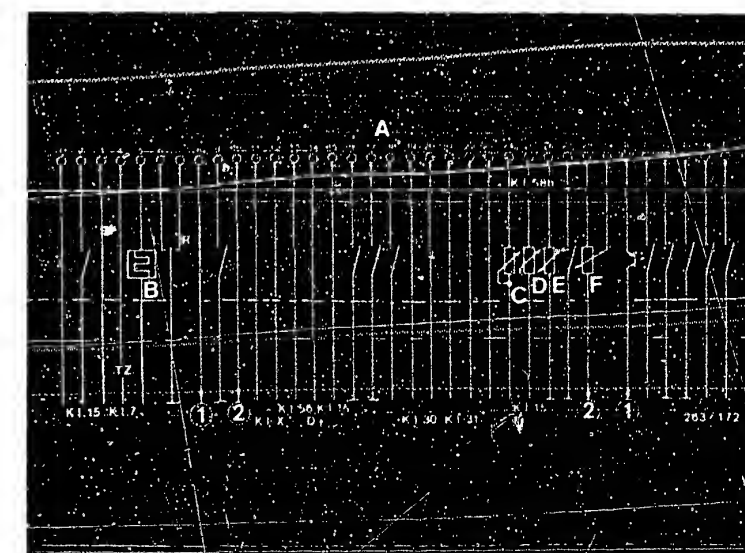


TEST STEP 21			
Operation		Reading	Testing
Program switch "V" to position:	19	On multimeter 2.4 ... 2.5 V	Component: Lambda- KE 2 pin 23
Program switch "Ω" to position:	-		
Measuring equipment: Universal test adapter multimeter			Operation: Voltage measurement
Measuring range: 0 ... 5 V			
Connection: Red test socket = + Black test socket = -			Malfunction: Voltage < 2.4 V or > 2.5 V
Operation in vehicle: Ignition on. Lambda sensor must be at operating temperature.			



- 1 = 35-pin connector on vehicle wiring harness
- 2 = Adapter lead
- 3 = Instrument cluster
- 5 = Universal test adapter
- 6 = Multimeter

Terminal diagram - vehicle wiring harness to instrument cluster



Possible faults:

Open circuit in lead to fuel-consumption sensor.

Lambda sensor defective.

Replace defective lead to control unit or Lambda sensor.

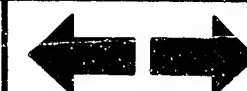
E9

Trouble-shooting
Audi

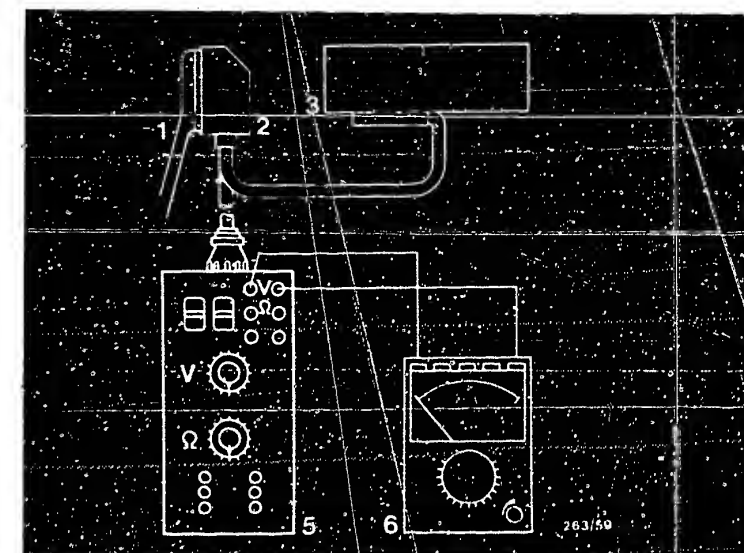


E10

Trouble-shooting
Audi



TEST STEP 22			
Operation		Reading	Testing
Program switch "V" to position:	20	On multimeter $0 \rightarrow U_{\text{Batt}}$	Component: Consumption KE/3 pin 3
Program switch "Ω" to position:	-	Change with engine running	
Measuring equipment: Universal test adapter multimeter			Operation: Voltage measurement
Measuring range: 0 ... 15 V			
Connection: Red test socket = + Black test socket = -			Malfunction: No change with engine running Voltage always 0 V or 12 V
Operation in vehicle: Engine running, lambda sensor must be at operating temperature.			



- 1 = 35-pin connector on vehicle wiring harness
- 2 = Adapter lead
- 3 = Instrument cluster
- 5 = Universal test adapter
- 6 = Multimeter

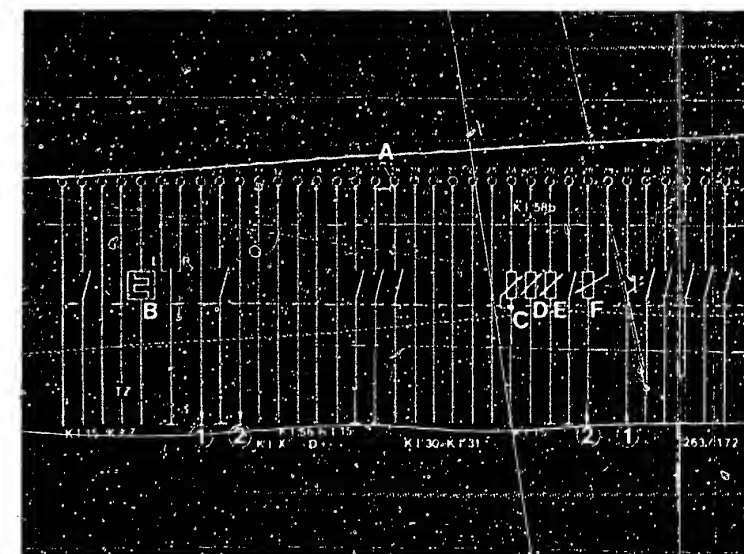
Terminal diagram - vehicle wiring harness to instrument cluster

Possible faults:

Open circuit in lead to KE3 control unit.

Instrument cluster defective.

Replace defective lead or instrument cluster.



E11

Trouble-shooting
Audi

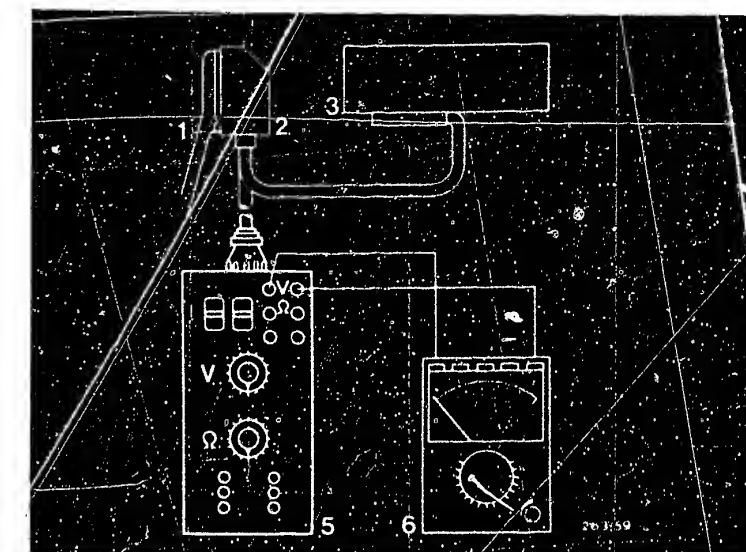


E12

Trouble-shooting
Audi



TEST STEP 23			
Operation		Reading	Testing
Program switch "V" to position:	21	On multimeter approx. 5 V	Component: Supply voltage for outside brightness sensor pin 8
Program switch "Ω" to position:	-		
Measuring equipment: Universal test adapter multimeter			Operation: Voltage measurement
Measuring range: 0 ... 12 V			
Connection: Red test socket = + Black test socket = -			Malfunction: Voltage > 5 V or < 0 V
Operation in vehicle: Engine running			



- 1 = 35-pin connector on vehicle wiring harness
- 2 = Adapter lead
- 3 = Instrument cluster
- 5 = Universal test adapter
- 6 = Multimeter

Terminal diagram - vehicle wiring harness to instrument cluster

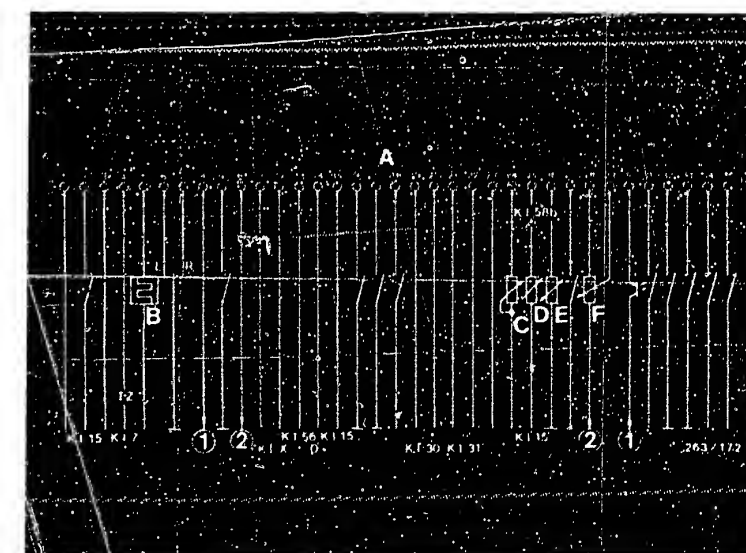
Possible faults:

Open circuit in lead from 35-pin plug pin 8 to outside brightness sensor.

Outside brightness sensor defective. Instrument cluster defective.

Replace defective outside brightness sensor.

Replace defective lead or instrument cluster.



E13

Trouble-shooting

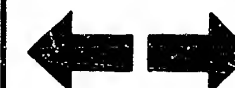
Audi



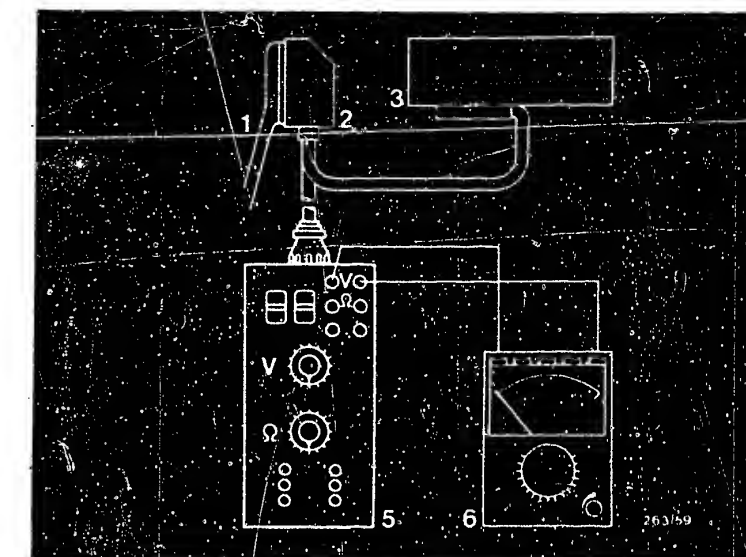
E14

Trouble-shooting

Audi



TEST STEP 24			
Operation		Reading	Testing
Program switch "V" to position:	22	On multimeter 0 → 5 V	Component: Outside brightness sensor pin 30
Program switch "Ω" to position:	-		
Measuring equipment: Universal test adapter multimeter			Operation: Voltage measurement
Measuring range: 0 ... 5 V			
Connection: Red test socket = + Black test socket = -			Malfunction: Voltage > 5 V or 0 V
Operation in vehicle: Ignition on			



- 1 = 35-pin connector on vehicle wiring harness
- 2 = Adapter lead
- 3 = Instrument cluster
- 5 = Universal test adapter
- 6 = Multimeter

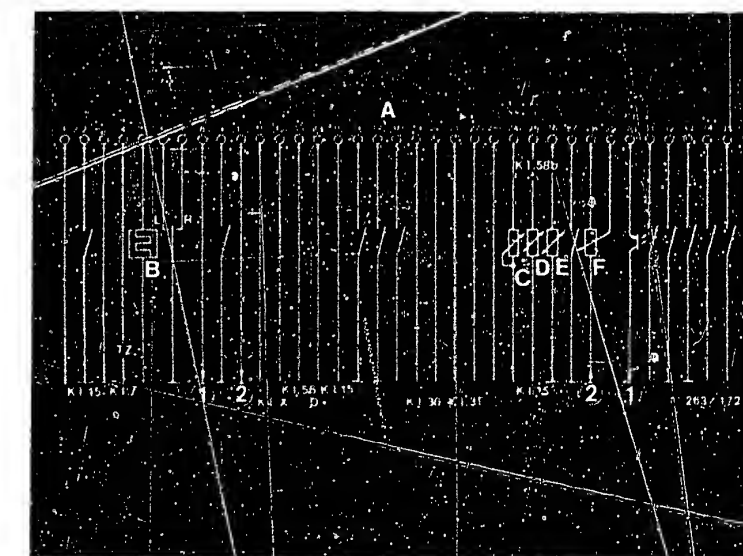
Terminal diagram - vehicle wiring harness to instrument cluster

Possible faults:

Open circuit in lead from 35-pin plug pin 30 to outside brightness sensor.

Outside brightness sensor or instrument cluster defective.

Replace defective lead, brightness sensor or instrument cluster.



E15

Trouble-shooting
Audi



E16

Trouble-shooting
Audi



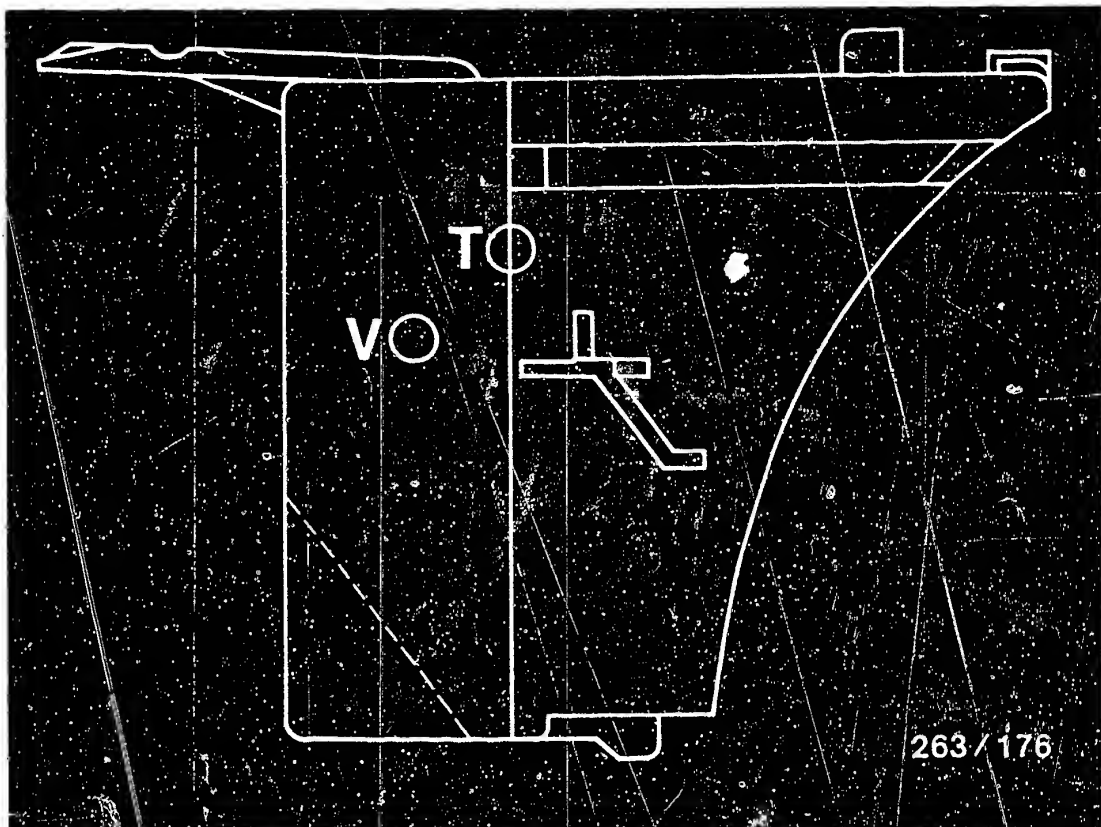
9. Adjusting the fuel gauge display, with instrument cluster taken out

If the fuel gauge sensor or the fuel tank has been taken out and replaced, the fuel gauge display must be re-adjusted.

- When working on the fuel system, follow accident prevention regulations and environmental and health regulations.

1. Replace the + connection to the electric fuel pump with a provisional lead.
Disconnect the fuel hose from the fuel pump, put on a separate hose, and direct it into a fuel canister. Connect the provisional electrical lead to the battery.
The fuel tank is pumped dry.
2. Put exactly 10 l into the fuel tank.
3. Calibration procedure (possible only in "litres", i.e. in metric system).
Ignition "Off":
Press reset button, and switch on ignition. Engine not running.
All scales and function designations are switched off.
Damping of fuel gauge is now off and display can be calibrated to 7 litres.





Adjusting the fuel gauge display (continued)

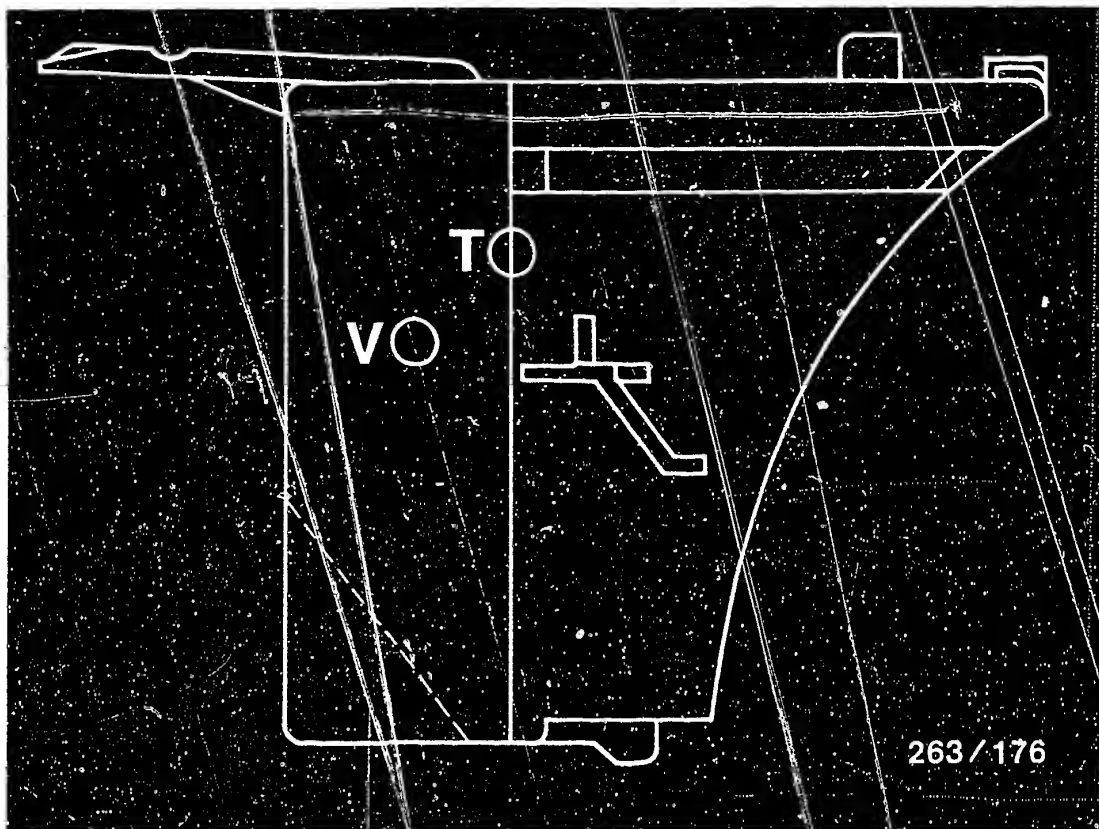
In the trip-computer field, the words "FUEL RANGE" appears with the indicated tank contents to be calibrated in litres x 10.

Using swrewdriver, turn the removed instrument cluster potentiometer "T" (see picture) so that the tank display shows precisely 7 l.

Calibration procedure is terminated with ignition "OFF" or by starting the engine.

During calibration, variant-specific code numbers appear in the display fields for trip computer and speedometer.





T = Tank correction

V = Consumption correction

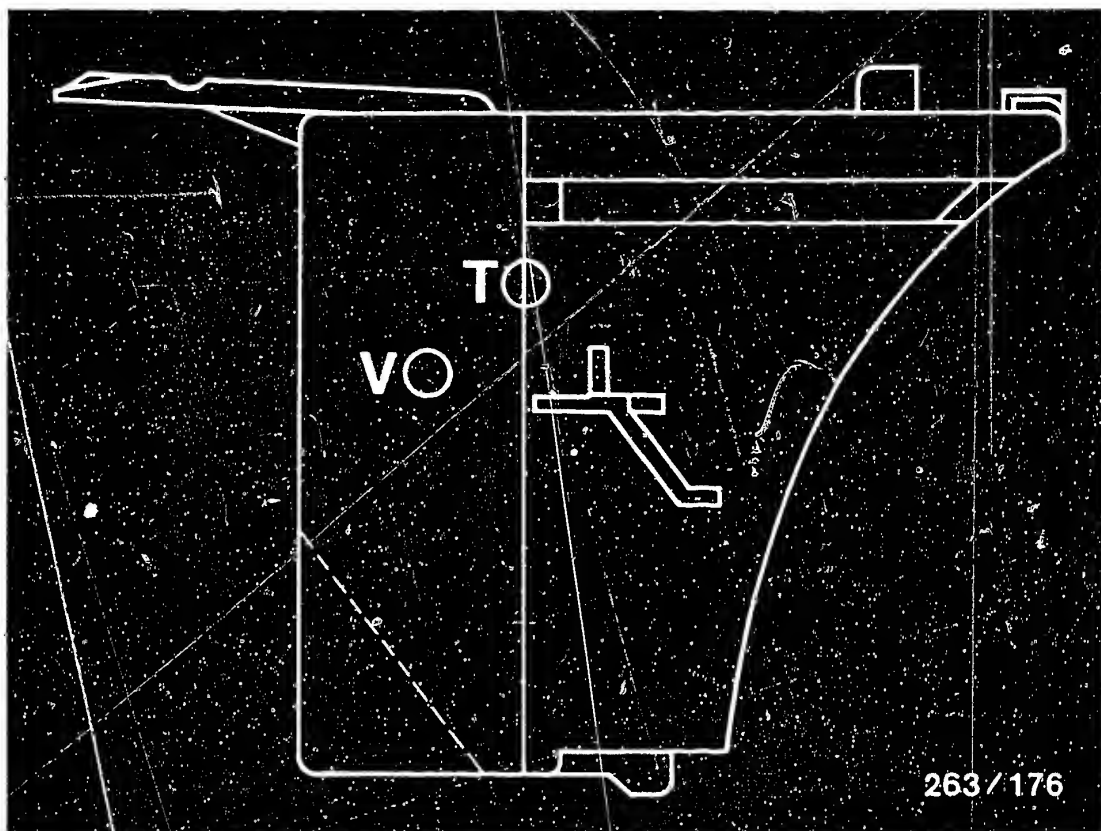
10. Adjusting the consumption display (0/100 km)

In the case of customer complaints about incorrect display of consumption - e.g. 10 % too much - is possible to re-adjust the consumption display:

In "tank calibration" mode, press reduced-display button for > 2 sec.

A 2-digit number appears on the right in the trip computer field. The consumption correction factor is $\pm 15\%$.





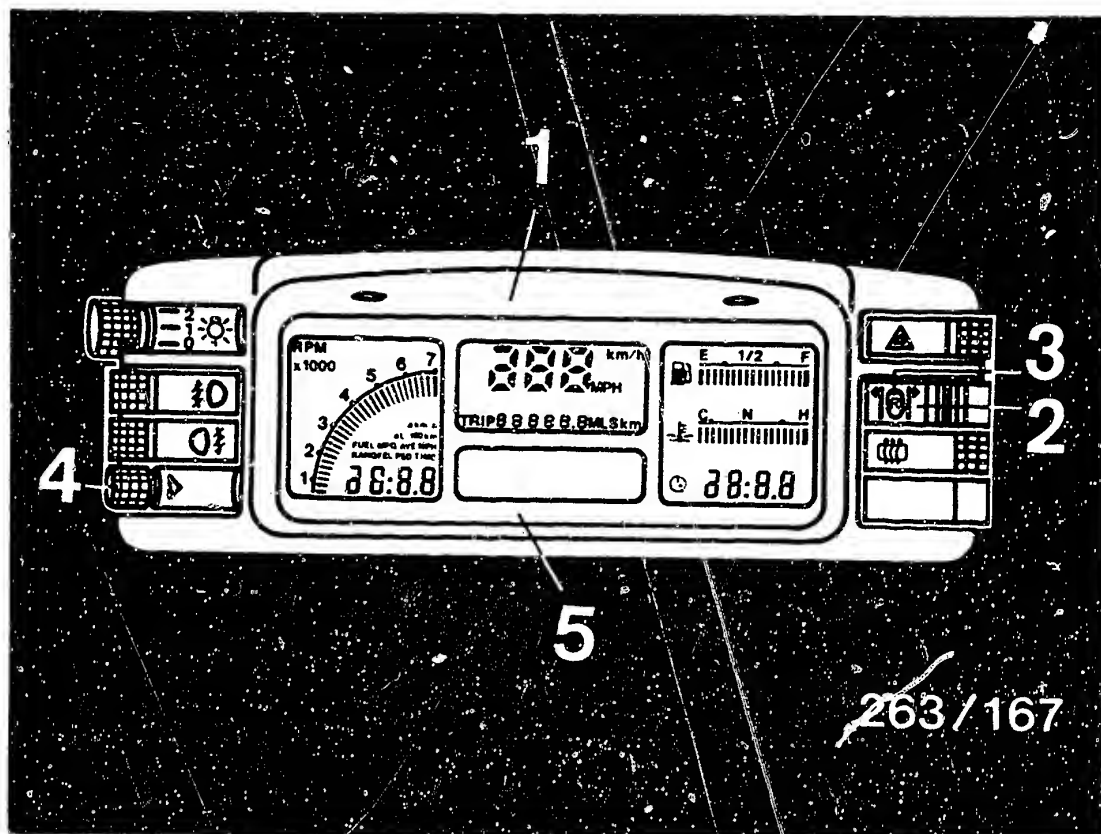
Adjusting the consumption display (continued)

Depending on the desired correction, it is now possible to adjust the consumption within the range of $\pm 15\%$ by means of potentiometer V (see picture).

The potentiometer in the instrument cluster is accessible from outside after taking off the cover hood.

From 0 to -15% a minus appears in front.
From 0 to $+15\%$ only the % figure appears in the display.





11. Setting the time (hours)

Press right-hand trip computer rocker ≥ 4 sec.
Trip computer field goes dark immediately.

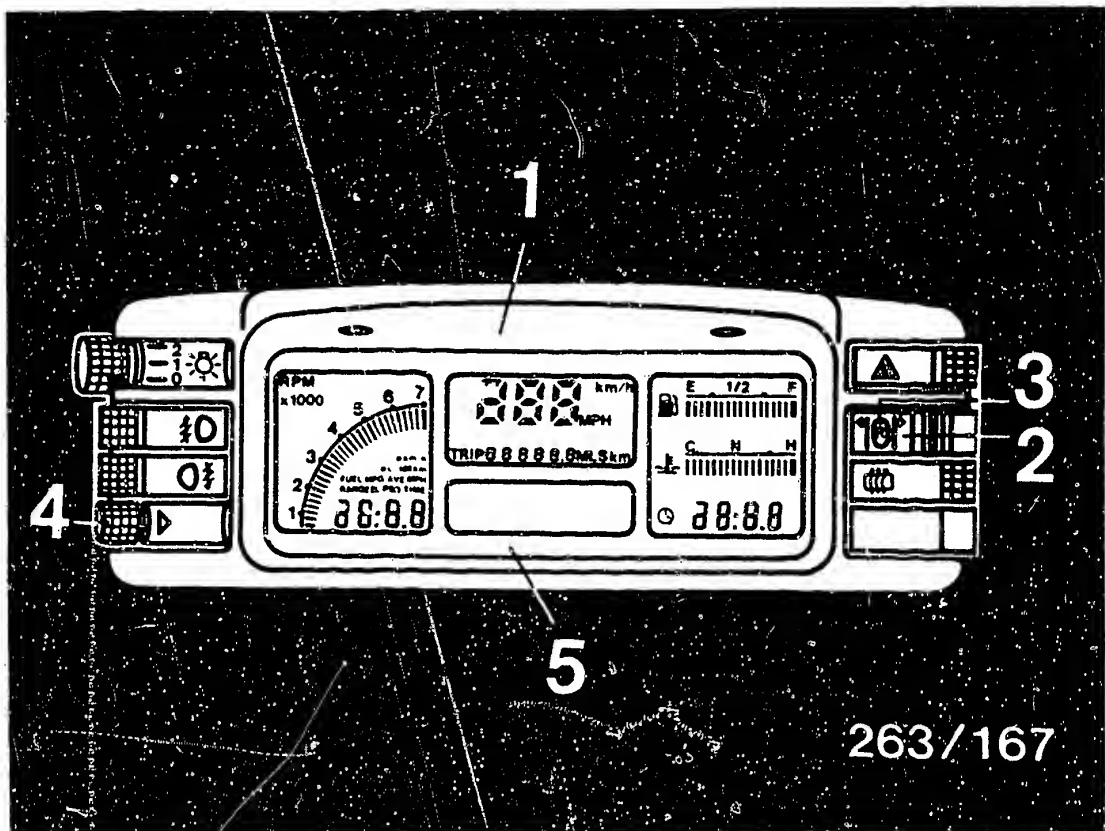
After ≥ 2 sec. mph or km/h flashes, i.e. system-of-
dimensions switchover has been selected.

After ≥ 4 sec. the hours display starts to flash.
With the reset button it is now possible to set the
hours.

If button is pressed for shorter than 0.5 sec. display
advances by "one".

Longer pressing of the reset button (> 0.5 sec.)
advances the hours at a rate of 2 Hz.





263/167

Setting the minutes display:

Starting from the hours position, press the right-hand rocker switch until the minutes display flashes.

With the reset button it is possible to set the minutes.

If button is pressed for shorter than 0.5 sec. display advances by "one" in each case.

Longer pressing than 0.5 sec. advances the minutes at a rate of 2 Hz.

Press the left-hand rocker; time is displayed.

Setting is completed.

The old function again appears in the trip computer field.



12. Checking USA/CDN switchover of system of dimensions

Switchover is by means of the rockers on the trip computer.

12.1 Press trip computer, right-hand, ≥ 2 sec,
 ≤ 4 sec.:

Trip computer field goes dark immediately.

After 2 sec. mph or km/h flashes, according to the currently set system of dimensions.

Release trip computer on right.

12.2 Press trip computer, right-hand, < 2 sec.:

The system of dimensions is switched over: the other dimension now flashes.

12.3 Press trip computer, left-hand, < 2 sec.:

Display on instrument cluster jumps to starting position.

Trip computer field goes bright.

Old trip computer function appears.

Current system-of-dimensions dimension lights steadily.



13. Checking odometer/tripmeter switchover

Switchover is by means of the rockers on the trip computer.

13.1 Press trip computer, left-hand, ≥ 2 sec.,
 ≤ 4 sec.:

Trip computer field goes dark immediately.
After ≥ 2 sec. mls, km or trip-mls, km flashes;
according to the currently set odometer display.
Release trip computer on left.

13.2 Press trip computer, left-hand, < 2 sec.:

The odometer display is switched over; the other
display symbol now flashes.

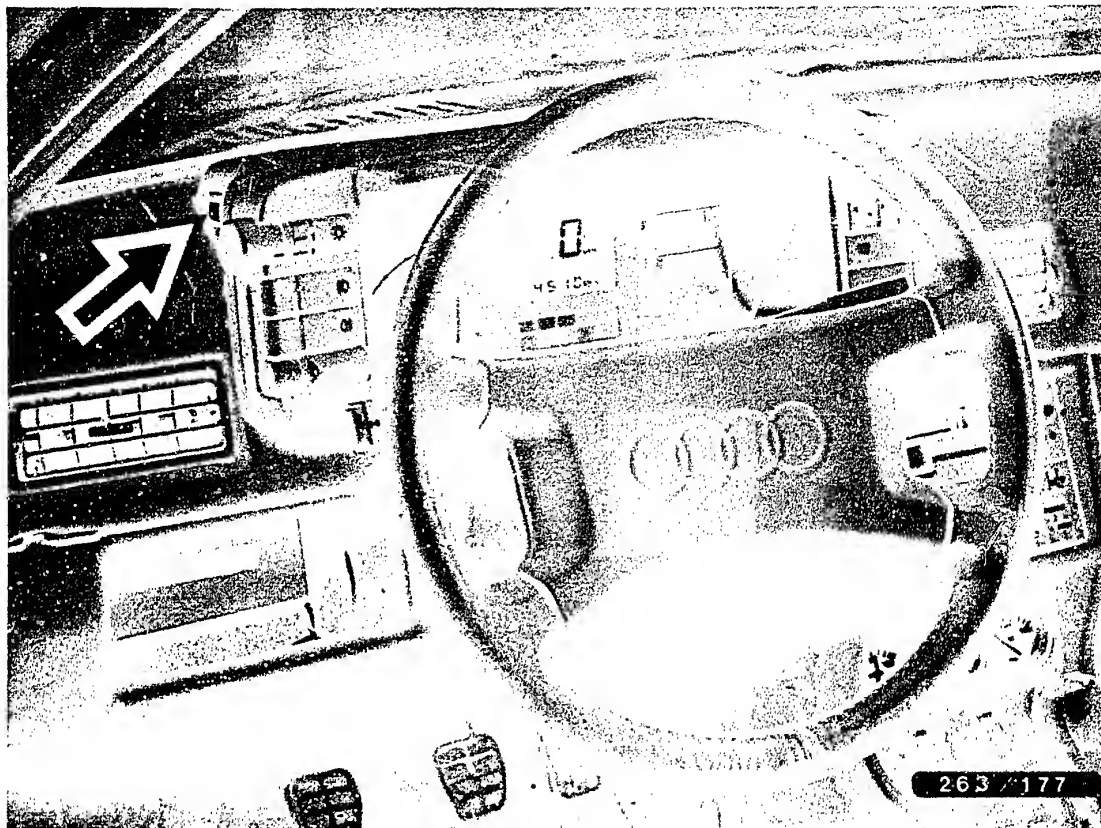
13.3 Press trip computer, right-hand, < 2 sec.:

Display on instrument cluster jumps to the
starting position.
Trip computer field goes bright.
Old trip computer function appears.
Current odometer display symbol lights steadily.

Note:

Resetting of the trip meter is possible only with
"TRIP-mls, km" flashing, i.e. only in switchover mode
in "trip meter" function: press reset button for
approx. 2 sec. Then return to starting position with
trip computer right-hand < 2 sec.





14. Checking lights warning

Cover up brightness sensor (see arrow).

After ignition "ON" warning must flash at 1 Hz.

Lights warning goes out after a distance of 62.5 m.

If driving lights (term. 56) have been switched on, the lights warning is suppressed during this time.

15. Checking trip computer

The trip computer is operated by the trip computer switch (right-hand rocker, left-hand rocker and reset).

The following functions can be selected by pressing the left-hand/right-hand rocker:

USA	Canada
MPG AVE	Ø 1 / 100 km
AVE MPH	Ø km/h
FUEL RANGE	FUEL RANGE
ELPSD TIME	ELPSD TIME

Between 10^0 and 10^1 there is a comma; between 10^1 and 10^2 there is a colon.

15.1 Reset button

Is used for the joint resetting or average consumption, average speed or elapsed time (driving time). Press reset button for at least 2 sec. Functions are set to 0.

In addition, the following can be performed:

- Tank calibration
- Acknowledgement of a warning
- Lighting up of displays (with ignition off)
- Setting the clock
- Resetting the trip meter



15.2 Function of trip computer rockers

Press right-hand rocker for approx. 0.2 ... 0.3 sec.:

- Advancing through trip computer functions
- Switchover between hours and minutes when setting the clock
- In "CDN/USA" selection mode, switchover between these two functions
- Exit from "odometer"/trip meter selection mode.

Press right-hand rocker for > 2 sec.:

- Enter "CDN/USA" selection mode from any desired trip computer function.

Press right-hand rocker for > 4 sec.:

- Enter "set time" mode from any desired trip computer function.

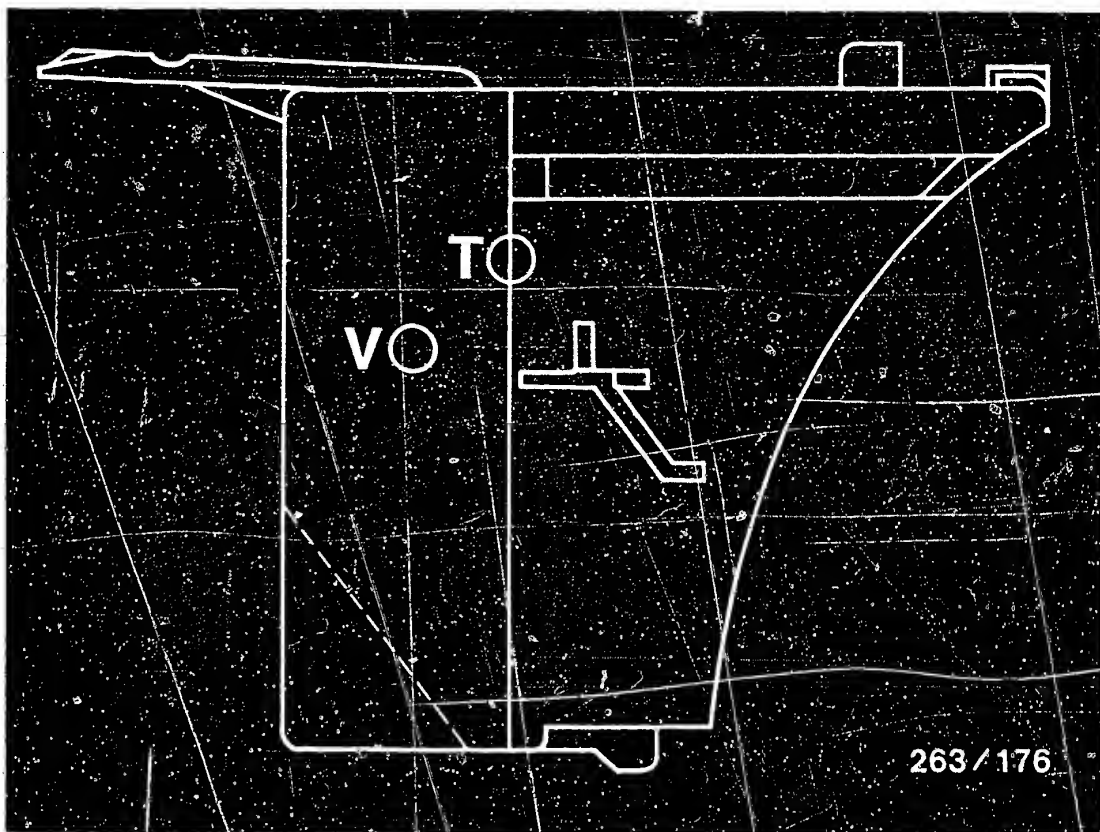
Press left-hand rocker for 0.2 ... 0.3 sec.:

- Advancing through trip computer functions
- In "setting time" mode: exit from setting mode.
- In "odometer/trip meter" selection mode: switchover between both functions
- Exit from "CDN/USA" selection mode.

Press left-hand rocker for > 2 sec.:

- Enter "odometer/trip meter" selection mode from any desired trip computer function.





16. Notes on replacement of instrument cluster

1. Setting consumption display on new instrument cluster:

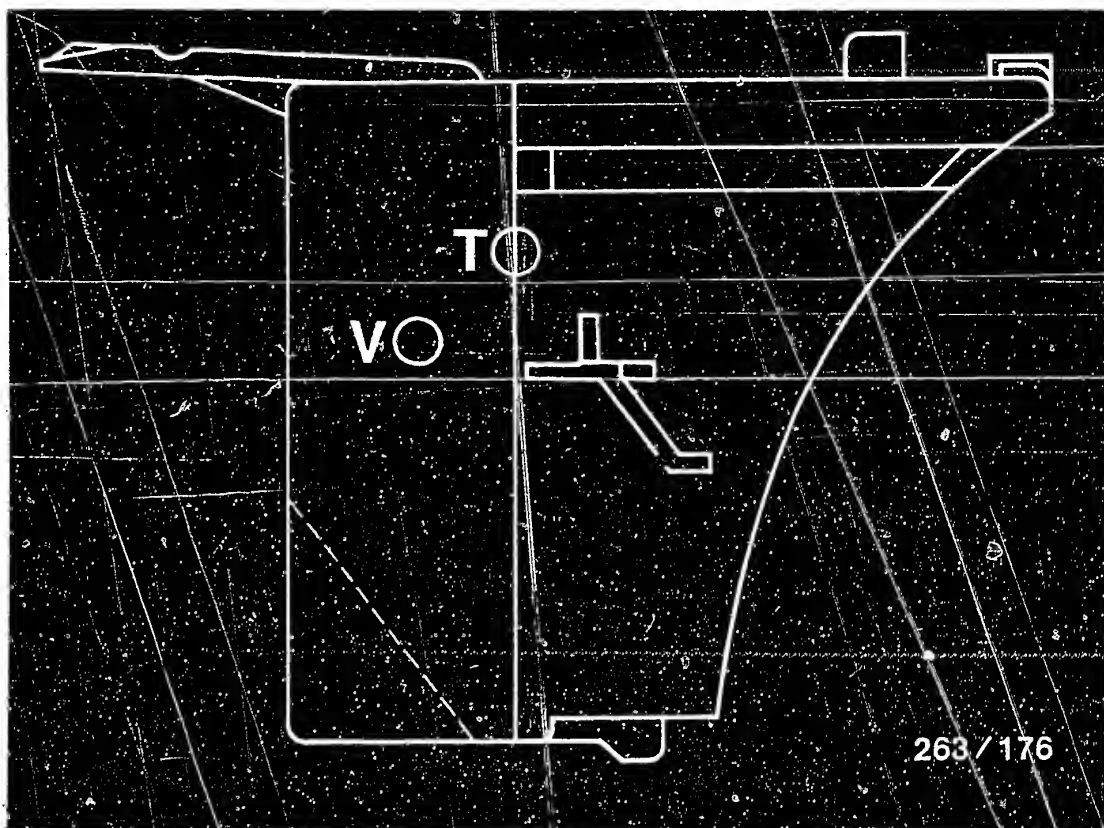
Read off correction factor on old instrument cluster.

In "tank calibration" mode press reduced-display button for > 2 sec.

A 2-digit number appears on the right in the trip computer field.

Make note of number.





2. Adjusting fuel gauge on new instrument cluster:

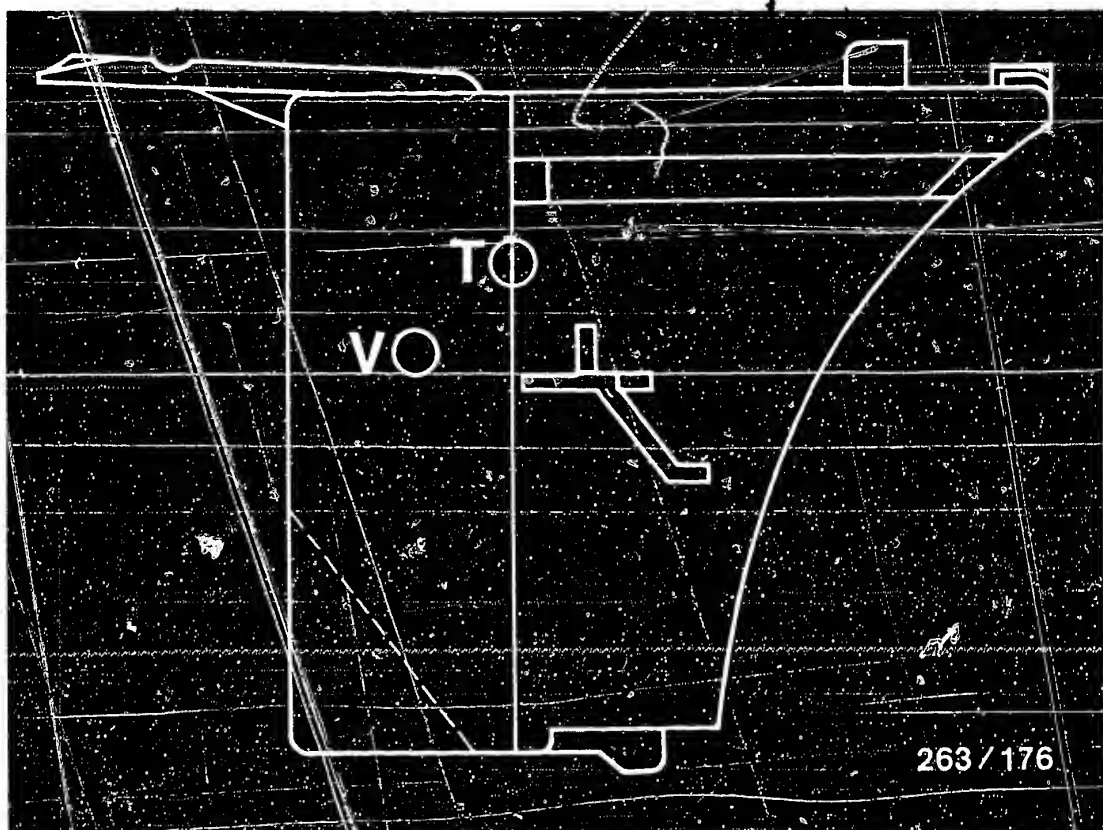
Read off tank contents on old instrument cluster.
Make note.

Connection of new instrument cluster

1. Adjust consumption display.

Set "tank calibration" mode on instrument cluster.

With potentiometer T on instrument cluster, set
value from old instrument cluster.



"Tank calibration" mode is exited by ignition off or consumption (i.e. vehicle operating).

2. Setting the fuel gauge

"Ignition off"

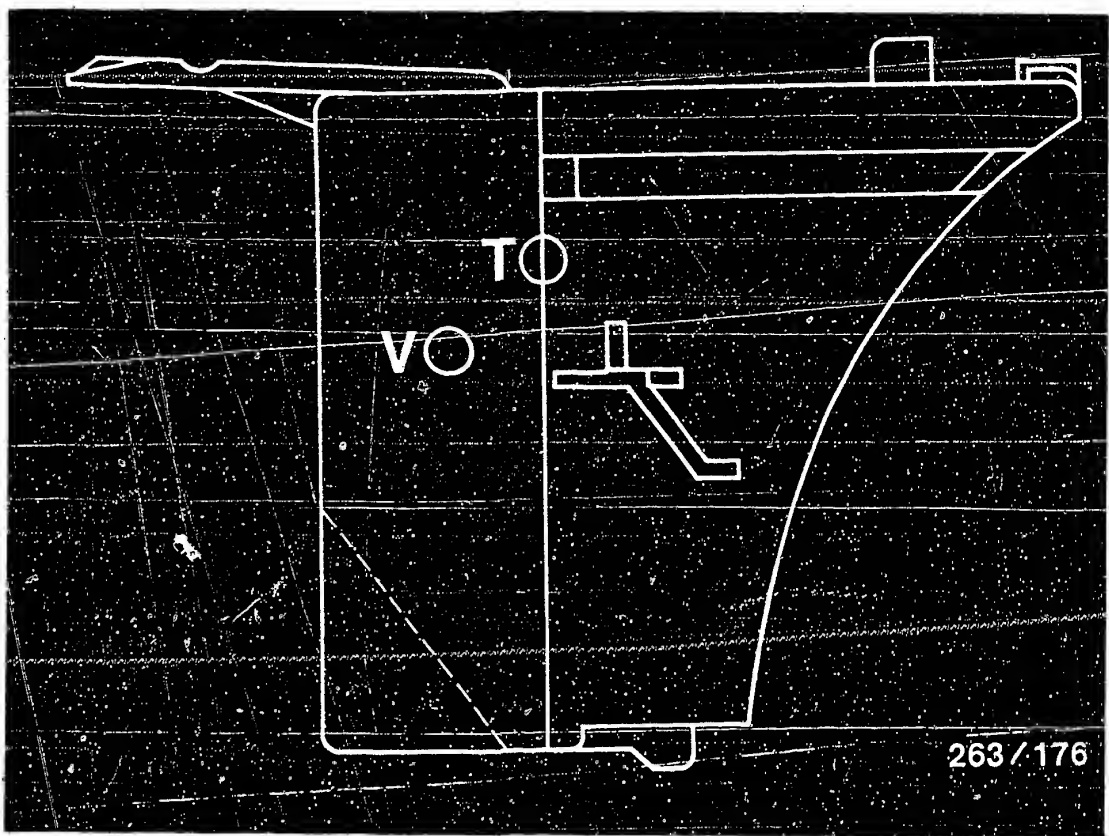
Press reset button while switching on ignition.

Engine not running.

All scales and function designations are switched off.

In the trip computer field the words "FUEL RANGE" appear with the displayed tank contents to be calibrated in litres x 10.





Using screwdriver, turn potentiometer "T" (see picture) on removed instrument cluster so that fuel gauge indicates the value read off from the old instrument cluster.

Calibration procedure is terminated by ignition "OFF" or by starting engine.

During the calibration procedure, variant-specific code numbers appear in the display fields for trip computer and speedometer.



After-sales Service

Motor Vehicle Service Information

Only for use within the Bosch organization. Not to be communicated to any third party.

DANGERS FOR ELECTRONIC EQUIPMENT
WHEN FAST-CHARGERS ARE USED

VDT-I-Gen. 040 En
7.1981

The results of recent investigations have led us to point out that damage to electrical components in the vehicle cannot be excluded when batteries are fast-charged or when starting-aids are used.

In particular, the control units for Motronic and ABS and the trigger boxes of transistorized ignition systems are most subjected to this danger.

To avoid damage to electrical apparatus the following instructions must be followed at all costs:

1. Do not use a fast-charger for starting the engine.
Starting aids should only be carried out with a second 12 V battery and a starting aid cable.

Please note: On account of the non-uniform demands placed by vehicle manufacturers on electronic products, we recommend that 24 V batteries are not to be used as a starting aid. Follow the operating instructions with the vehicle.

2. Disconnect the battery from the vehicle electrical system before fast-charging.
3. Never disconnect the battery from the vehicle electrical system with the engine running.
4. After fast-charging, tighten properly the terminals on the terminal posts of the battery.
5. When the battery is charged in the vehicle or when starting aids are used, follow the instructions with the fast-charger as well as the instructions of the vehicle manufacturer.

The main cause of the damage to electrical components are high-energy voltage peaks which are brought about by switching procedures and by unintentionally incorrect operation.

The danger increases with an increasingly sulphated battery, since the attenuating effect of the battery decreases.

BOSCH

Geschäftsbereich KH - Kundendienst Kfz-Ausrüstung
by Robert Bosch GmbH D-7 Stuttgart 1 Postfach 50 Printed in the Federal Republic of Germany
Imprimé en République Fédérale d'Allemagne par Robert Bosch GmbH

N1

Motor Vehicle Service Information

Audi



Table of contents

<u>Section</u>	<u>Coordinates</u>
Structure of microcard	A 1
1. Special features	A 2
2. General introduction	A 3
3. Rapid diagnosis chart	A 17
4. Test equipment	B 3
5. Terminal diagram (terminal assignment) of instrument cluster	B 5
6. Installation position of components	B 9
7. Trouble-shooting	C 1
7.1 Trouble-shooting according to fault symptoms	C 1
7.2 Trouble-shooting according to test steps	C 7
7.3 Functional test of instrument cluster	C 8
7.4 Removal of instrument cluster	C 13
7.5 Connection of universal test adapter	C 15
8. Trouble-shooting program	C 16
9. Setting the fuel gauge, instrument cluster removed	E 17
10. Adjusting the consumption display	E 19
11. Setting the time	E 21



Table of contents (continued)

<u>Section</u>	<u>Coordinates</u>
12. Checking system-of-dimensions switchover USA/CDN	E 23
13. Checking odometer/trip meter switchover	E 24
14. Checking lights warning	F 1
15. Checking trip computer	F 2
16. Notes on replacement of instrument cluster	F 4
Motor Vehicle Service Information (Danger to electronic equipment if operating with fast chargers)	N 1

© 1986 Robert Bosch GmbH
Automotive Equipment - After-Sales Service
Department for Technical Publications KH/VDT,
Postfach 50, D-7000 Stuttgart 1.

Published by:
After-Sales Service Department for Training and
Technology (KH/VSK)
Press date: 3. 1986.

Please direct questions and comments concerning the
contents to our authorized representative in your
country.

This publication is intended only for the Bosch
After-Sales Service Organization, and may not be
passed on to third parties without our consent.

Microfilmed in the Federal Republic of Germany.
Microphotographié en République Fédérale d'Allemagne.

